

* 1800A JOB 55-238-50 2NDFROZE TIME: 02:34.4

H-1800 12 06 67 0052 cccccccc

* YUL 2NDFROZE

THIS REPRINT IS FOR EYLES

633436A YUL SYSTEM FOR AGC: REVISION 0 OF PROGRAM BURST120 BY NASA 2021106-031 DEC 7, 1967

L ASSEMBLY AND OPERATION INFORMATION USER'S OWN PAGE NO. 1

R0001

R0002 THIS LISTING IS A COPY OF A VERSION OF THE PROGRAM INTENDED FOR USE IN THE ON-BOARD PRIMARY GUIDANCE
R0004 COMPUTER IN THE UNMANNED FLIGHT OF APOLLO LUNAR MODULE 1 --- THE AS206 MISSION.

R0006 THE DETAILS OF IMPLEMENTATION ARE SPECIFIED IN REPORT R-527, "GUIDANCE SYSTEM OPERATIONAL PLAN AS206",
R0008 AS AMENDED.

R0009 REPORT R-527 AND THIS PROGRAM HAVE BEEN PREPARED BY THE INSTRUMENTATION LABORATORY, MASSACHUSETTS
R0011 INSTITUTE OF TECHNOLOGY, 75 CAMBRIDGE PARKWAY, CAMBRIDGE, MASSACHUSETTS, UNDER DSR PROJECT 55-23850, SPONSORED
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L ASSEMBLY AND OPERATION INFORMATION USER'S OWN PAGE NO. 2

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R0016 ----- -- --- --*--

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R0051 TRIM GIMBAL CONTROL SYSTEM
R0052 AOSTASK AND AOSJOB
R0053 SPS BACK-UP RCS CONTROL
R0054 ATTITUDE MANEUVER ROUTINE
R0055 GIMBAL LOCK AVOIDANCE
R0056 KALCMANU STEERING
R0057 MISSION PHASE 2 GUIDANCE REFERENCE RELEASE + BOOST MONITOR
R0058 MP 3 - SUBORBITAL ABORT
R0059 MP4-CONTINGENCY ORBIT INSERTION
R0060 MISSION PHASE 6 COAST SIVB ATTACHED
R0061 MP 7 - SIVB/LEM SEPARATION
R0062 MISSION PHASE 8 - DPS COLD SOAK
R0063 MP9-DPS 1 BURN

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R0064	MISSION PHASE 11 - DPS2/FITH/APS1
R0065	MISSION PHASE 13 - APS2
R0066	MISSION PHASE 16 - RCS COLD SOAK
R0067	INTEGRATION INITIALIZATION
R0068	ORBITAL INTEGRATION PROGRAM
R0069	LMP COMMAND ROUTINES
R0070	AS206 MISSION SCHEDULING PACKAGE
R0071	206 SERVICE ROUTINES
R0072	TUMBLE MONITOR
R0073	PIPA READER
R0074	FIND CDU DESIRED
R0075	AVERAGE G INTEGRATOR
R0076	MASS CALCULATOR
R0077	THROTTLE CONTROL
R0078	IMU COMPENSATION PACKAGE
R0079	DUMMY 206 INITIALIZATION
R0080	SECOND DPS GUIDANCE
R0081	PREBURN FOR APS2
R0082	ASCENT STEERING
R0083	THRUST MAGNITUDE FILTER
R0084	LOGSUBI ROUTINE
R0085	LAMB
R0086	SUM CHECK END OF BANK MARKERS
R0087	INTER-BANK COMMUNICATION
R0088	INTERPRETER
R0089	SINGLE PRECISION SUBROUTINES
R0090	EXECUTIVE
R0091	WAITLIST
R0092	AGC BLOCK TWO SELF-CHECK

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P0093 VERB AND NOUN INFORMATION

R0094 REGULAR VERBS
R0095 01 DISPLAY OCTAL COMP 1 (R1)
R0096 02 DISPLAY OCTAL COMP 2 (R1)
R0097 03 DISPLAY OCTAL COMP 3 (R1)
R0098 04 DISPLAY OCTAL COMP 1,2 (R1,R2)
R0099 05 DISPLAY OCTAL COMP 1,2,3 (R1,R2,R3)
R0100 06 DECIMAL DISPLAY
R0101 07 DP DECIMAL DISPLAY (R1,R2)
R0102 10 SPARE
R0103 11 MONITOR OCT COMP 1 (R1)
R0104 12 MONITOR OCT COMP 2 (R1)
R0105 13 MONITOR OCT COMP 3 (R1)
R0106 14 MONITOR OCT COMP 1,2 (R1)
R0107 15 MONITOR OCT COMP 1,2,3 (R1,R2,R3)
R0108 16 MONITOR DECIMAL
R0109 17 MONITOR DP DECIMAL (R1,R2)
R0110 20 SPARE
R0111 21 LOAD COMP 1 (R1)
R0112 22 LOAD COMP 2 (R2)
R0113 23 LOAD COMP 3 (R3)
R0114 24 LOAD COMP 1,2 (R1,R2)
R0115 25 LOAD COMP 1,2,3 (R1,R2,R3)
R0116 26 SPARE
R0117 27 FIXED MEMORY DISPLAY
R0118 30 REQUEST EXECUTIVE
R0119 31 REQUEST WAITLIST
R0120 32 C(R2) INTO R_3, C(R1) INTO R_2
R0121 33 PROCEED WITHOUT DATA
R0122 34 TERMINATE CURRENT TEST OR LOAD REQUEST
R0123 35 TEST LIGHTS
R0124 36 FRESH START
R0125 37 CHANGE MAJOR MODE
R0126 END OF REGULAR VERBS

R0127 EXTENDED VERBS
R0128 40 ZERO(USED WITH NOUN 20) (N 40 UNUSED IN 206)
R0129 41 COARSE ALIGN (USED WITH NOUN 20) (N 40 UNUSED IN 206)
R0130 42 FINE ALIGN IMU
R0131 43 LOAD IMU ATTITUDE ERROR METERS
R0132 44 ILLEGAL VERB
R0133 45 COMMAND LR TO POSITION 2 (UNUSED IN 206)
R0134 46 SAMPLE RADAR ONCE PER SECOND (UNUSED IN 206)
R0135 47 PERFORM LEM FCS TEST
R0136 50 PLEASE PERFORM

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R0137   51  PLEASE MARK
R0138   52  PLEASE MARK Y
R0139   53  PLEASE MARK X OR Y
R0140   54  PULSE TORQUE GYROS
R0141   55  ALIGN TIME
R0142   56  PERFORM BANKSUM
R0143   57  PERFORM SYSTEM TEST
R0144   60  ILLEGAL VERB
R0145   61  ILLEGAL VERB
R0146   62  SCAN LEM INBITS
R0147   63  TURN OFF DAP AND SEND CDU'S ONLY ON DOWNLINK.
R0148   64  SET TIMER TO GROUND ELAPSED TIME
R0149   65  SET GUIDANCE REFERENCE RELEASE DISCRETE
R0150   66  INITIATE LGC DFI TLM CALIBRATE ROUTINE
R0151   67  SEND COMMAND TO LMP
R0152   70  SET MISSION TIMER
R0153   71  SET MISSION PHASE REGISTER
R0154   72  SET MISSION PHASE REGISTER + TIMER
R0155   73  RESET DPS OR RPS COLD SOAK DISCRETE
R0156   74  STOP MISSION TIMERS
R0157   75  TARGET PARAMETER UPDATE
R0158   76  STATE VECTOR UPDATE
R0159   77  ILLEGAL VERB
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L ASSEMBLY AND OPERATION INFORMATION USER'S OWN PAGE NO. 6

P0160	NORMAL NOUNS		SCALE AND DECIMAL POINT	
R0162	00	NOT IN USE		
R0163	01	SPECIFY MACHINE ADDRESS (FRACTIONAL)	(.XXXXX)	
R0164	02	SPECIFY MACHINE ADDRESS (WHOLE)	(XXXXX.)	
R0165	03	SPECIFY MACHINE ADDRESS (DEGREES)	(XXX.XXDEGREES)	
R0166	04	SPECIFY MACHINE ADDRESS (HOURS)	(XXX.XXHOURS)	
R0167	05	SPECIFY MACHINE ADDRESS (SECONDS)	(XXX.XXSECONDS)	
R0168	06	SPECIFY MACHINE ADDRESS (GYRO DEGREES)	(XX.XXXDEGREES)	
R0169	07	SPARE		
R0170	10	CHANNEL TO BE SPECIFIED		
R0171	11	SPARE		
R0172	12	SPARE		
R0173	13	SPARE		
R0174	14	SPARE		
R0175	15	INCREMENT MACHINE ADDRESS	(OCTAL ONLY)	
R0176	16	TIME SECONDS	(XXX.XXSECONDS)	
R0177	17	TIME HOURS	(XXX.XXHOURS)	
R0178	20	ICDU	(XXX.XXDEGREES)	
R0179	21	PIPAS	(XXXXX.PULSES)	
R0180	22	NEW ANGLES 1	(XXX.XXDEGREES)	
R0181	23	DELTA ANGLES 1	(XXX.XXDEGREES)	
R0182	24	DELTA TIME (SECONDS)	(XXX.XXSECONDS)	
R0183	25	CHECKLIST	(XXXXX.)	
R0184	26	PRIO/DELAY, ADRES, BBCON	(OCTAL ONLY)	
R0185	27	SELF TEST ON/OFF SWITCH	(XXXXX.)	
R0186	30	STAR NUMBERS	(XXXXX.)	
R0187	31	ALMCADR, ALMCADR +1, ERCOUNT	(OCTAL ONLY)	
R0188	32	DECISION TIME (MIDCOURSE)	(XXX.XXHOURS (INTERNAL UNITS = WEEKS))	
R0190	33	EPHEMERIS TIME (MIDCOURSE)	(XXX.XXHOURS (INTERNAL UNITS = WEEKS))	
R0192	34	MEASURED QUANTITY (MIDCOURSE)	(XXXX.XKILOMETERS)	
R0193	35	INBIT MESSAGE	(OCTAL ONLY)	
R0194	36	LANDMARK DATA 1	(OCTAL ONLY)	
R0195	37	LANDMARK DATA 2	(OCTAL ONLY)	
R0196	40	RENDEZVOUS RADAR ANGLES (TRUNION,SHAFT)	(XXX.XXDEGREES)	(UNUSED IN 206)
R0198	41	NEW RENDEZVOUS RADAR ANGLES (TRUNION,SHAFT)	(XXX.XXDEGREES)	(UNUSED IN 206)
R0200	42	ADT ROTATION ANGLES	(XXX.XXDEGREES)	
R0201	43	ADT DETENT CODE	(XXXXX.)	
R0202	44	FORWARD VELOCITY, LATERAL VELOCITY	(XXXXX.FEET/SEC)	
R0203	45	ROTATIONAL HAND CONTROLLER ANGLE RATES	(XXXXX.DEG/SEC)	(NOT USED IN 206)
R0205	46	SPARE		
R0206	47	SPARE		
R0207	50	FAILREG, FAILREG +1, FAILREG +2	(OCTAL ONLY)	
R0208	51	SPARE		
R0209	52	GYRO BIAS DRIFT	(.BBXXXXXMILLIRAD/SEC)	
R0211	53	GYRO INPUT AXIS ACCELERATION DRIFT	(.BBXXXXX(MILLIRAD/SEC)/(CM/SEC SEC))	
R0213	54	GYRO SPIN AXIS ACCELERATION DRIFT	(.BBXXXXX(MILLIRAD/SEC)/(CM/SEC SEC))	
R0215	END OF NORMAL NOUNS			

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		MIXED NOUNS	SCALE AND DECIMAL POINT	
R0216				
R0218	55	LANDING RADAR ALTITUDE, TIME (SECONDS)	(XXXXX.FEET, XXX.XXSEC)	(UNUSED IN 206)
R0220	56	LANDING RADAR VELX, TIME (SECONDS)	(XXXXX.FEET/SEC, XXX.XXSEC)	(UNUSED IN 206)
R0222	57	LANDING RADAR VELY, TIME (SECONDS)	(XXXXX.FEET/SEC, XXX.XXSEC)	(UNUSED IN 206)
R0224	60	LANDING RADAR VELZ, TIME (SECONDS)	(XXXXX.FEET/SEC, XXX.XXSEC)	(UNUSED IN 206)
R0226	61	TARGET AZIMUTH AND ELEVATION	(XXX.XXDEG, XX.XXXDEG)	
R0228	62	RENDEZVOUS RADAR RANGE, TRUNION, SHAFT	(XXXXXB.FEET, XXX.XXDEG, XXX.XXDEG)	(UNUSED IN 206)
R0230	63	RENDEZVOUS RADAR RANGE RATE, TRUNION, SHAFT	(XXXXX.FEET/SEC, XXX.XXDEG, XXX.XXDEG)	(UNUSED IN 206)
R0232	64	INITIAL ALTITUDE, FINAL ALTITUDE, ALT. RATE	(XXXXX.FEET, XXXXX.FEET, XXXXX.FEET/SEC)	
R0234	65	SAMPLED TIME (HOURS AND SECONDS)	(XXX.XXHOURS, XXX.XXSEC)	
R0236		(FETCHED IN INTERRUPT)		
R0237	66	SYSTEM TEST RESULTS	(XXXXX., .XXXXX, XXXXX.)	
R0239	67	DELTA GYRO ANGLES	(XX.XXXDEG FOR EACH)	
R0240	70	SPARE		
R0241	71	SPARE		
R0242	72	DELTA POSITION	(XXXX.XKILOMETERS FOR EACH)	
R0244	73	DELTA VELOCITY	(XXXX.XMETERS/SEC FOR EACH)	
R0246	74	MEASUREMENT DATA (MIDCOURSE)	(XXX.XXHOURS (INTERNAL UNITS=WEEKS), XXXX.XKILOMETERS, XXXXX.	
R0248	75	MEASUREMENT DEVIATIONS (MIDCOURSE)	(XXXX.XKILOMETERS, XXXX.XMETERS/SEC, XXXX.XKILOMETERS)	
R0250	76	POSITION VECTOR	(XXXX.XKILOMETERS FOR EACH)	
R0252	77	VELOCITY VECTOR	(XXXX.XMETERS/SEC FOR EACH)	

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P0254 TABLE OF ERROR CODES

R0255 OPTICS SUB-SYSTEM

R0256	00105	MARK SYSTEM CURRENTLY IN USE
R0257	00111	MARK IS MISSING AFTER V53 ENTER
R0258	00112	AOTMARK SYSTEM HAS NOT BEEN INITIALIZED TO ACCEPT THIS MARK
R0259	00113	NO BIT 3, 4, 5, 6, OR 7 (INBITS) IN CHANNEL 16
R0260	00114	REQUESTED MARK NOT MADE
R0261	00115	NO MARK TO REJECT

R0262 IMU SUB-SYSTEM

R0263	00205	SATURATED-PIPA ALARM
R0264	00206	ZERO CDU NOT ALLOWED WITH COARSE ALIGN AND GIMBAL LOCK
R0265	00207	ISS TURN-ON REQUEST NOT PRESENT FOR 90 SECONDS
R0266	00210	IMU NOT OPERATING WHEN ICDU ZERO REQUESTED
R0267	00211	COARSE ALIGN ERROR. GIMBAL ANGLES NOT WITHIN 2 DEGREES OF DESIRED ANGLES
R0269	00212	PIPA FAIL WITH PIPA FAIL INHIBIT BIT SET
R0270	00213	ISS TURN ON REQUEST WITH ISS OPERATIVE DISCRETE NOT PRESENT
R0271	00214	PROGRAM USING IMU WHEN TURNED OFF

R0272 DISPLAY ALARMS (PART 1)

R0273	00300	ABORT COMMAND RECEIVED BUT ABORT NOT ENABLED
R0274	00310	CURTAINS ALARM (BADEND IN ATTSTALL, IMUSTALL, ETC., USUALLY) WHEN ALARM2 IS CALLED BY CURTAINS
R0276		ALMCADR CONTAINS Q OF ROUTINE WHICH
R0278	00312	DAP MANEUVER PREVENTED BY FAILURE OF JETS CALLS CURTAINS
R0280	00315	FORGETIT ALARM
R0281	00316	RESTART OCCURRED BUT PROGRAM WASN'T RESTARTABLE (FAKESTRT)

R0282 PROCEDURAL DIFFICULTY

R0283	00401	DESIRED GIMBAL ANGLES YIELD GIMBAL LOCK
R0284	00404	COMPUTED DT FOR WAITLIST TOO BIG OR NEGATIVE (TASKSETR - MP 9). ABORT.
R0286	00405	LAMBERT ITERATIONS NOT CONVERGING -- MISSION PHASE 13
R0287	00410	OVERFLOW PRIOR TO OR DURING COMPUTATION OF ACS OR AFCS (MP 11)
R0288	00411	OVERFLOW IN ANG MOMENTUM CMD (COMPUTATION OF AFCS1) (MP 11)
R0289	00412	OVERFLOW AFTER COMPUTATION OF AFCS1 (MP 11)
R0290		

L ASSEMBLY AND OPERATION INFORMATION USER'S OWN PAGE NO. 9

R0291 RADAR ERRORS

R0292	00501	RADAR ANTENNA OUT OF LIMITS OF EACH MODE	
R0293	00502	DESIRED RADAR GIMBAL ANGLES OUT OF LIMITS OF EACH MODE	
R0294	00503	NO RENDEZVOUS RADAR DATA GOOD SIGNAL WITHIN 30 SECONDS WITH LOCKON REQUESTED	
R0296	00510	RENDEZVOUS ZERO CDU REQUESTED WITH RENDEZVOUS RADAR NOT IN AUTO MODE	
R0298	00514	RADAR RENDEZVOUS AUTO POWER OFF WITH PROGRAM USING THE RENDEZVOUS RADAR	
R0300	00520	RADAR RUPT OCCURRED BUT NOT EXPECTED	
R0301	00521	RADAR DATA COULD NOT BE READ	
R0302	00522	LANDING RADAR NOT IN DESIRED POSITION	
R0303	00523	LANDING RADAR DID NOT ACHIEVE POSITION 2 UPON REQUEST IN DESIRED TIME INTERVAL	
R0305	00524	TARGET VECTOR REQUIRES RENDEZVOUS RADAR ANGLES NOT WITHIN LIMITS OF EITHER MODE	

R0307 MISSION SCHEDULER ERRORS

R0308	00601	MISSION PHASE DUE BUT PHASE REGISTER = 0	

R0309 COMPUTER HARDWARE MALFUNCTIONS

R0310	01102	AGC SELF TEST ERROR	WHEN ALARM2 IS CALLED BY ERRORS
R0312			ALMCADR CONTAINS Q OF ROUTINE WHICH
R0314			CALLS ERRORS
R0316	01103	UNUSED CCS BRANCH EXECUTED. ABORT	WHEN ABORT2 IS CALLED BY CCSHOLE
R0318			ALMCADR CONTAINS Q OF ROUTINE WHICH
R0320			CALLED CCSHOLE
R0322	01105	DOWNLINK TOO FAST	
R0323	01106	UPLINK TOO FAST	
R0324	01107	PHASE TABLE ENTRIES DO NOT AGREE -- DO A FRESH START	
R0325	01110	RESTART BUT NO GROUPS ACTIVE	

R0326 LIST OVERFLOWS (ALL ABORTS)

R0327	01201	EXECUTIVE OVERFLOW - NO VAC AREAS	WHEN ABORT2 IS CALLED BY ABORT
R0329	01202	EXECUTIVE OVERFLOW - NO CORE SETS	ALMCADR CONTAINS Q OF ROUTINE
R0331	01203	WAITLIST OVERFLOW - TOO MANY TASKS	WHICH CALLED ABORT
R0333	01206	KEYBOARD AND DISPLAY WAITING LINE OVERFLOW	
R0334	01207	NO VAC AREA FOR MARKS	
R0335	01210	MORE THAN ONE IMU, RR, AOT, OR ATTITUDE PROGRAM ATTEMPTING TO USE STALL ROUTINES AT SAME TIME	

R0337 INTERPRETER ERRORS

R0338	01301	ARCSIN-ARCCOS INPUT ANGLE TOO LARGE. ABORT	

L ASSEMBLY AND OPERATION INFORMATION USER'S OWN PAGE NO. 10

R0339 01302 SQRT CALLED WITH NEGATIVE ARGUMENT. ABORT

R0340 DISPLAY ALARMS (PART 2)

R0341 01405 DV ALARM. ENGINE ON BUT NO THRUST
R0342 01410 JET FAIL DURING FCS TEST
R0343 01411 CDU DOES NOT AGREE WITH COMMAND TO 1 DEGREE
R0345 01412 CDU DOES NOT AGREE WITH COMMAND TO 5 DEGREES
R0347
R0349
R0351
R0353 KEYBOARD AND DISPLAY PROGRAM

ALMCADR FOR ALL ROUTINES WHICH CALL ALARMS (WHICH CALLS ALARM) WILL CONTAIN ALARMS +3. Q OF THE ORIGINATING ROUTINE WILL BE STORED AT QPLACE

R0354 01501 KEYBOARD AND DISPLAY ERROR DURING INTERVAL USE. ABORT

R0355 SYSTEM TEST ALARMS

R0356 01600 DRIFT TEST OVERFLOW
R0357 01601 BAD IMU TORQUE IN DRIFT OR IN GYROCOMPASS

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P0358   INSTRUCTION CODES:
R0359
R0360   NORMAL (NON-EXTENDED) CODES:
R0361
R0362   TC          000          TRANSFER CONTROL
R0363   CCS         001 00       COUNT, COMPARE, AND SKIP
R0364   TCF         001 01       TRANSFER CONTROL TO FIXED
R0365   TCF         001 10       DITTO
R0366   TCF         001 11       DITTO
R0367   DAS         010 00       DP ADD TO STORAGE
R0368   LXCH        010 01       EXCHANGE L WITH STORAGE
R0369   INCR        010 10       INCREMENT STORAGE
R0370   ADS         010 11       ADD TO STORAGE
R0371   CA          011          CLEAR AND ADD
R0372   CS          100          CLEAR AND SUBTRACT
R0373   INDEX       101 00       INDEX NEXT INSTRUCTION
R0374   DXCH        101 01       DP EXCHANGE WITH STORAGE
R0375   TS          101 10       TRANSFER TO STORAGE
R0376   XCH         101 11       EXCHANGE A WITH STORAGE
R0377   AD          110          ADD
R0378   MASK        111          MASK ("AND" TO A)
R0379
R0380
R0381   EXTENDED CODES:
R0382
R0383   READ        000 00 0     READ FROM CHANNEL
R0384   WRITE       000 00 1     WRITE CHANNEL
R0385   RAND        000 01 0     READ, "AND" TO A
R0386   WAND        000 01 1     WRITE, "AND" TO A
R0387   ROR         000 10 0     READ, "OR" TO A
R0388   WOR         000 10 1     WRITE, "OR" TO A
R0389   RXOR        000 11 0     READ, EXCLUSIVE "OR" TO A
R0390   EDRUPT      000 11 1     INTERRUPT
R0391
R0392   DV          001 00       DIVIDE
R0393   BZF         001 01       BRANCH ON ZERO TO FIXED
R0394   BZF         001 10       DITTO
R0395   BZF         001 11       DITTO
R0396   MSU         010 00       MODULAR SUBTRACT
R0397   QXCH        010 01       EXCHANGE Q WITH STORAGE
R0398   AUG         010 10       AUGMENT STORAGE
R0399   DIM         010 11       DIMINISH STORAGE
R0400   DCA         011          DP CLEAR AND ADD
R0401   DCS         100          DP CLEAR AND SUBTRACT
R0402   INDEX       101          INDEX NEXT EXTENDED INSTR.
R0403   SU          110 00       SUBTRACT
R0404   BZMF        110 01       BRANCH ON 0 OR - TO FIXED
R0405   BZMF        110 10       DITTO
R0406   BZMF        110 11       DITTO
R0407   MP          111          MULTIPLY
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L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 1

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0001                0000  A         EQUALS 0
0002                0001  L         EQUALS 1          L AND Q ARE BOTH CHANNELS AND REGISTERS.
0003                0002  Q         EQUALS 2
0004                0003  EBANK     EQUALS 3
0005                0004  FBANK     EQUALS 4
0006                0005  Z         EQUALS 5          ADJACENT TO FBANK AND BBANK FOR DXCH Z
0007                0006  BBANK     EQUALS 6          (DTCB) AND DXCH FBANK (DTCF).
A0008                                                 REGISTER 7 IS A ZERO-SOURCE. USED BY ZL.

0009                0010  ARUPT     EQUALS 10         INTERRUPT STORAGE.
0010                0011  LRUPT     EQUALS 11
0011                0012  QRUPT     EQUALS 12
0012                0013  SAMPTIME  EQUALS 13         SAMPLED TIME 1 & 2.
0013                0015  ZRUPT     EQUALS 15         (13 AND 14 ARE SPARES.)
0014                0016  BANKRUPT  EQUALS 16         USUALLY HOLDS FBANK OR BBANK.
0015                0017  BRUPT     EQUALS 17         RESUME ADDRESS AS WELL.

0016                0020  CYR       EQUALS 20
0017                0021  SR        EQUALS 21
0018                0022  CYL       EQUALS 22
0019                0023  EDOP      EQUALS 23         EDITS INTERPRETIVE OPERATION CODE PAIRS.


0020                0024  TIME2     EQUALS 24
0021                0025  TIME1     EQUALS 25
0022                0026  TIME3     EQUALS 26
0023                0027  TIME4     EQUALS 27
0024                0030  TIME5     EQUALS 30
0025                0031  TIME6     EQUALS 31
0026                0032  CDUX      EQUALS 32
0027                0033  CDUY      EQUALS 33
0028                0034  CDUZ      EQUALS 34
0029                0035  OPTY      EQUALS 35
0030                0036  OPTX      EQUALS 36
0031                0037  PIPAX     EQUALS 37
0032                0040  PIPAY     EQUALS 40
0033                0041  PIPAZ     EQUALS 41
0034                0042  BMAGX     EQUALS 42
0035                0042  RHCP      EQUALS 42
0036                0043  BMAGY     EQUALS 43
0037                0043  RHCY      EQUALS 43
0038                0044  BMAGZ     EQUALS 44
0039                0044  RHCR      EQUALS 44
0040                0045  INLINK    EQUALS 45
0041                0046  RNRAD     EQUALS 46
0042                0047  GYROCTR   EQUALS 47
0043                0047  GYROCMD   EQUALS 47
0044                0050  CDUXCMD   EQUALS 50
0045                0051  CDUYCMD   EQUALS 51
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L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 2

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0046                    0052  CDUZCMD  EQUALS 52
0047                    0053  OPTYCMD  EQUALS 53
0048                    0054  OPTXCMD  EQUALS 54
0049                    0055  EMSD     EQUALS 55
0050                    0055  THRUST   EQUALS 55
0051                    0056  LEMONM   EQUALS 56
0052                    0057  OUTLINK  EQUALS 57
0053                    0060  ALTM     EQUALS 60

R0054   VAC-RELATIVE INTERPRETER ASSIGNMENTS:

0055                    0042  LVSQUARE EQUALS 34D   SQUARE OF VECTOR INPUT TO ABVAL AND UNIT
0056                    0044  LV       EQUALS 36D   LENGTH OF VECTOR INPUT TO UNIT.
0057                    0046  X1       EQUALS 38D   INTERPRETIVE SPECIAL REGISTERS RELATIVE
0058                    0047  X2       EQUALS 39D   TO THE WORK AREA.
0059                    0050  S1       EQUALS 40D
0060                    0051  S2       EQUALS 41D
0061                    0052  QPRET    EQUALS 42D
```

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P0062 GENERAL ERASABLE ASSIGNMENTS.

```
0063                                0061        SETLOC 61

R0064          THE FOLLOWING SET COMPRISES THE INTERRUPT TEMPORARY STORAGE POOL.

R0066          ANY OF THESE MAY BE USED AS TEMPORARIES DURING INTERRUPT OR WITH INTERRUPT INHIBITED. THE ITEMP SERIES
R0068 IS USED DURING CALLS TO THE EXECUTIVE AND WAITLIST - THE RUPTREGS ARE NOT.

0070                          0061  0061 ITEMP1    ERASE
0071 REF  1                         0061 WAITEXIT  EQUALS ITEMP1
0072 REF  2 LAST  14                0061 EXECTEM1  EQUALS ITEMP1

0073                          0062  0062 ITEMP2    ERASE
0074 REF  1                         0062 WAITBANK  EQUALS ITEMP2
0075 REF  2 LAST  14                0062 EXECTEM2  EQUALS ITEMP2

0076                          0063  0063 ITEMP3    ERASE
0077 REF  1                         0063 WAITADR   EQUALS ITEMP3
0078 REF  2 LAST  14                0063 NEWPRIO   EQUALS ITEMP3

0079                          0064  0064 ITEMP4    ERASE
0080 REF  1                         0064 LOCCTR    EQUALS ITEMP4
0081 REF  2 LAST  14                0064 WAITTEMP  EQUALS ITEMP4

0082                          0065  0065 ITEMP5    ERASE
0083 REF  1                         0065 NEWLOC    EQUALS ITEMP5

0084                          0066  0066 ITEMP6    ERASE
A0085                               NEWLOC+1 EQUALS ITEMP6          DP ADDRESS.

0086                                0067        SETLOC 67           NEWJOB MUST BE IN LOCATION 67.
0087                          0067  0067 NEWJOB    ERASE                    ----

0088                          0070  0070 RUPTREG1  ERASE
0089                          0071  0071 RUPTREG2  ERASE
0090                          0072  0072 RUPTREG3  ERASE
0091                          0073  0073 RUPTREG4  ERASE
0092 REF  1                         0073 KEYTEMP1  EQUALS RUPTREG4
0093 REF  2 LAST  14                0073 OSRUPTEM  EQUALS RUPTREG4

0094 REF  1                         0070 RCSMONT1  EQUALS RUPTREG1      FOUR TEMPORARIES USED BY RCSMONIT
0095 REF  1                         0071 RCSMONT2  EQUALS RCSMONT1 +1   ROUTINE (PART OF T4RUPT).  THEIR ORDER
0096 REF  2 LAST  14                0072 RCSMONT3  EQUALS RCSMONT1 +2   IS NOT IMPORTANT, & THEY DON'T EVEN HAVE
0097 REF  3 LAST  14                0073 RCSMONT4  EQUALS RCSMONT1 +3   TO BE ADJACENT LOCATIONS.
```

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```
P0098           FLAG & SWITCH RESERVATIONS.

0099                                0074    0103  STATE     ERASE  +7          120 SWITCHES

0100    REF   1                             0075  FLAGWRD1  EQUALS STATE +1
0101    REF   2 LAST  15                    0076  FLAGWRD2  EQUALS STATE +2
0102    REF   3 LAST  15                    0077  DAPBOOLS  EQUALS STATE +3
0103    REF   4 LAST  15                    0100  FLAGWRD4  EQUALS STATE +4

0104    REF   5 LAST  15                    0101  LMPJFAIL  EQUALS STATE +5
0105    REF   6 LAST  15                    0102  CH5MASK   EQUALS STATE +6
0106    REF   7 LAST  15                    0103  CH6MASK   EQUALS STATE +7

R0107           INTERPRETIVE SWITCH BIT ASSIGNMENTS:

0108                                        0000  WMATFLAG  EQUALS 0
0109                                        0001  JSWITCH   EQUALS 1
0110                                        0002  MIDFLAG   EQUALS 2
0111                                        0003  MOONFLAG  EQUALS 3
0112                                        0004  NBSMBIT   EQUALS 4
0113                                        0005  CDUROFIN  EQUALS 5
0114                                        0007  IMUSE     EQUALS 7
0115                                        0010  RRUSE     EQUALS 8D
0116                                        0011  RRNBSW    EQUALS 9D
0117                                        0012  LOKONSW   EQUALS 10D
0118                                        0032  SIVBGONE  EQUALS 26D
0119                                        0034  GRRFLAG   EQUALS 28D
0120                                        0074  CONVSW    EQUALS 60D
0121                                        0075  DONESW    EQUALS 61D
0122                                        0076  ITERSW    EQUALS 62D
0123                                        0077  GUESSW    EQUALS 63D
0124                                        0100  PIESW     EQUALS 64D
0125                                        0101  MOONSW    EQUALS 65D
0126    REF   1                             0101  ESCPSW    EQUALS MOONSW
0127    REF   2 LAST  15                    0101  SMANGLSW  EQUALS MOONSW
0128                                        0102  BAKTO4    EQUALS 66D
0129                                        0103  DIRECT    EQUALS 67D
0130                                        0104  PASS      EQUALS 68D
0131                                        0105  HI        EQUALS 69D
0132                                        0106  INTEGRSW  EQUALS 70D

0133                                        0107  ENGOFFSW  EQUALS 71D

R0134   NOTE THAT FLAGWRD1 AND FLAGWRD2 CORRESPOND TO INTERPRETIVE SWITCHES 15D THROUGH 44D.  DAPBOOLS AND
R0136       FLAGWRD4 CORRESPOND TO INTERPRETIVE SWITCHES 45D THROUGH 74D.

R0137                    BIT      FLAGWORD   SWITCH   SWITCH    ON-STATE          OFF-STATE
R0139   LOCATION         NUMBER   SYMBOL     NUMBER   SYMBOL    INDICATES         INDICATES
R0141   --------         ------   --------   ------   ------    ---------         ---------
```

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R0143	STATE	1		14		AVAILABLE	
R0144		2		13		AVAILABLE	
R0145		3		12		AVAILABLE	
R0146		4		11		AVAILABLE	
R0147		5	LOKONFLG	10	LOKONSW	RADAR LOCK-ON REQUEST	NO RADAR LOCK-ON REQUEST (LOCKED ON 0)
R0149							
R0151		6		9	RRNBSW	RADAR TARGET IN NAVIGATION BASE COORDINATES	RADAR TARGET IN STABLE MEMBER COORDINATES
R0153							
R0155		7	RRUSEFLG	8	RRUSE	RENDEZVOUS RADAR IN USE	RENDEZVOUS RADAR NOT IN USE (LOCKED ON 0)
R0157							
R0159		8	IMUSEFLG	7	IMUSE	IMU IN USE	IMU NOT IN USE
R0161		9		6		AVAILABLE	
R0162		10		5	CDAROFIN	VECTOR IN NAVIGATION BASE COORDINATES	VECTOR IN STABLE MEMBER COORDINATES
R0164							
R0166		11		4	NBSMBIT	STAR POSITION IN NAVIGATION BASE COORDINATES	STAR POSITION IN STABLE MEMBER COORDINATES
R0168							
R0170		12		3	MOONFLAG	LUNAR ORBIT	EARTH ORBIT (LOCKED ON 0)
R0172		13		2	MIDFLAG	MID-COURSE ORBIT	EARTH OR LUNAR LOCAL ORBIT (LOCKED ON 0)
R0174							
R0176		14		1	JSWITCH	W-MATRIX BEING EXTRAPOLATED	STATE VECTOR BEING EXTRAPOLATED (LOCKED ON 0)
R0178							
R0180		15		0	WMATFLAG	W-MATRIX TO BE EXTRAPOLATED	NO W-MATRIX EXTRAPOLATION (LOCKED ON 0)
R0182							

R0184	FLAGWRD1	1		29		AVERAGE G INTEGRATING	AVERAGE G NOT INTEGRATING
R0186		2		28		GUIDANCE REFERENCE RELEASE HAS OCCURRED	GUIDANCE REFERENCE RELEASE HAS NOT OCCURRED
R0188							
R0190							
R0192		3		27		CCC FAILURE. NO FURTHER UPLINK COMMANDS EXCEPT ERROR RESET ACCEPTED	UPLINK ERROR RESET OR NO CCC FAILURE
R0194							
R0196							
R0198		4		26	SIVBGONE	SIVB JETTISONED	SIVB ATTACHED
R0200		5	ENGINBIT	25		TO DV MONITOR ENGINE SHOULD BE ON	TO DV MONITOR ENGINE SHOULD BE OFF
R0202							
R0204		6		24		GO TO ENDOFJOB AT AVGEND	GO TO POOH AT AVGEND
R0206		7		23		AVAILABLE	
R0207		8		22		FINE ALIGN INHIBITED DUE TO GIMBAL LOCK	FINE ALIGN ALLOWED
R0209							
R0210		9		21		AVAILABLE	
R0211		10		20		AVAILABLE	
R0212		11		19		AVAILABLE	
R0213		12		18		NORMAL RESTART ALLOWED	FAKE START ALLOWED
R0215		13		17		EXCESSIVE TUMBLING	NO EXCESSIVE TUMBLING
R0217		14		16		TUMBLE MONITOR ON	TUMBLE MONITOR OFF
R0219		15		15		AVAILABLE	

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R0220	FLAGWRD2	1	44		RCS COLD SOAK INHIBIT	RCS COLD SOAK ALLOWED (CAN BE SET TO 0 ONLY BY UPDATE V73)
R0222						
R0224						
R0226		2	43		DPS COLD SOAK INHIBIT	DPS COLD SOAK ALLOWED
R0228		3	42		RCS TESTING INHIBIT	RCS TESTING ALLOWED (CAN BE SET TO 0 ONLY BY UPDATE V73)
R0230						
R0232		4	41		TRIM GIMBAL DISENABLED DUE TO THROTTLING	TRIM GIMBAL ALLOWED
R0234						
R0235		5	40		MISSION PHASE TIMERS ENABLED	MISSION PHASE TIMERS NOT ENABLED
R0237						
R0239		6	39		V33 VERIFICATION OF UPDATE PROGRAM WHEN INVERTED	V33 VERIFICATION OF UPDATE PROGRAM WHEN INVERTED
R0241						
R0243		7	38		ORBITAL INTEGRATION INTEGRATING	ORBITAL INTEGRATION NOT INTEGRATING
R0245						
R0247		8	37		ASC FEED TEST IN PROCESS	ASC FEED TEST NOT IN PROCESS
R0249		9	36		ABORT COMMAND MONITOR ENABLED	ABORT COMMAND MONITOR NOT ENABLED
R0251						
R0253		10	35		ABORT COMMAND RECEIVED AND ACCEPTED	ABORT COMMAND NOT RECEIVED OR NOT ACCEPTED
R0255						
R0257		11	34		KALCMANJ IN PROCESS	KALCMANU NOT IN PROCESS
R0259		12	33		IGNORE FINAL YAW	FINAL YAW ADJUSTMENT REQUIRED
R0261		13	32		START UPDATE PROCESS FOR DESIRED CDU ANGLES IN KALCMANU	UPDATE PROCESS FOR DESIRED CDU ANGLES CONTINUES DURING KALCMANU
R0263						
R0265						
R0267		14	31		NO FINAL YAW REQUIRED FOR THREE AXIS ALIGNMENT	FINAL YAW REQUIRED FOR THREE AXIS ALIGNMENT
R0269						
R0271		15	30		SPACECRAFT IN NON-ACCELERATED FLIGHT	SPACECRAFT IN ACCELERATED FLIGHT
R0273						
R0275	DAPBOOLS	1 - 15	45 - 59		DEFINED IN LOG SECTION "DAP INTERFACE SUBROUTINES"	
R0277	FLAGWRD4	1	74		AVAILABLE	
R0278		2	73		AVAILABLE	
R0279		3	72		AVAILABLE	
R0280		4	71	ENGOFFSW	ENGINE OFF COMMAND HAS BEEN SENT AND FURTHER COMMANDS ARE PROHIBITED	ENGINE OFF COMMAND HAS NOT BEEN SENT AND COMMAND IS ALLOWED
R0282						
R0284						
R0286		5	70	INTEGRSW	IGNITION STATE DELAYED	NORMAL IGNITION STATE
R0288		6	69	HC	RCO NOT CONTROLLED	RCO CONSTRAINED
R0290		7	68	PASS	BYPASS TCO CALC IN ASCENT	DO TCO CALCULATION
R0292		8	67	DIRECT	ASCENT EQ SET FOR MP 13	ASCENT EQ SET FOR MP 4
R0294		9	66	BAKTO4	TGO ESTIMATOR USED IN MP4	TGO ESTIMATOR USED IN ASCENT STEERING
R0296						
R0298		10	65	MOONSW	INSIDE MOONSPHERE	OUTSIDE MOONSPHERE (LOCKED ON 0)
R0300						
R0302		10	65	ESCPSW	HYPERBOLIC TRAJECTORY	ELLIPTICAL ORBIT (LOCKED ON 0)

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R0304	10	65	SMANGLSW	NORMALIZED TIME	TIME SCALED +7 (LOCKED ON 0)
R0306	11	64	PIESW	TRANSFER ANGLE GREATER THAN 180 DEGREES	TRANSFER ANGLE LESS THAN 180 DEGREES
R0308					
R0310	12	63	GUESSW	GUESS IS AVAILABLE	LAMBERT COMPUTES GUESS
R0312	13	62	ITERSW	FIRST LAMBERT ITERATION	OTHER THAN FIRST LAMBERT ITERATION
R0314					
R0316	14	61	DONESW	LAMBERT ROUTINE COMPLETION	LAMBERT ROUTINE NOT COMPLETE
R0318	15	60	CONVSW	LAMBERT ROUTINE NON-CONVERGENCE	LAMBERT ROUTINE CONVERGENCE
R0320					

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```
P0321           THE FOLLOWING ARE EXECUTIVE TEMPORARIES WHICH MAY BE USED BETWEEN CCS NEWJOB INQUIRIES.

 0323                                0104    0104  INTB15+  ERASE                    REFLECTS 15TH BIT OF INDEXABLE ADDRESSES
 0324  REF   1                             0104  DSEXIT   =       INTB15+           RETURN FOR DSPIN
 0325  REF   2 LAST  19                    0104  EXITEM   =       INTB15+           RETURN FOR SCALE FACTOR ROUTINE SELECT
 0326  REF   3 LAST  19                    0104  BLANKRET =       INTB15+           RETURN FOR 2BLANK

 0327                                0105    0105  INTBIT15 ERASE                    SIMILAR TO ABOVE.
 0328  REF   1                             0105  WRDRET   =       INTBIT15          RETURN FOR 5BLANK
 0329  REF   2 LAST  19                    0105  WDRET    =       INTBIT15          RETURN FOR DSPWD
 0330  REF   3 LAST  19                    0105  DECRET   =       INTBIT15          RETURN FOR PUTCOM(DEC LOAD)
 0331  REF   4 LAST  19                    0105  21/22REG =       INTBIT15          TEMP FOR CHARIN

R0332           THE REGISTERS BETWEEN ADDRWD AND PRIORITY MUST STAY IN THE FOLLOWING ORDER FOR INTERPRETIVE TRACE.

 0334                                0106    0106  ADDRWD   ERASE                    12 BIT INTERPRETIVE OPERAND SUB-ADDRESS.

 0335                                0107    0107  POLISH   ERASE                    HOLDS CADR MADE FROM POLISH ADDRESS.
 0336  REF   1                             0107  UPDATRET =       POLISH            RETURN FOR UPDATNN, UPDATVB
 0337  REF   2 LAST  19                    0107  CHAR     =       POLISH            TEMP FOR CHARIN
 0338  REF   3 LAST  19                    0107  ERCNT    =       POLISH            COUNTER FOR ERROR LIGHT RESET
 0339  REF   4 LAST  19                    0107  DECOUNT  =       POLISH            COUNTER FOR SCALING AND DISPLAY (DEC)
 0340  REF   5 LAST  19                    0107  PWRPTR   =       POLISH            ROOTPSRS PWR TABL POINTER

 0341                                0110    0110  FIXLOC   ERASE                    WORK AREA ADDRESS.

 0342                                0111    0111  OVFIND   ERASE                    SET NON-ZERO ON OVERFLOW.

 0343                                0112    0117  VBUF     ERASE  +5                TEMPORARY STORAGE USED FOR VECTORS.
 0344  REF   1                             0112  SGNON    =       VBUF              TEMP FOR +,- ON
 0345  REF   2 LAST  19                    0112  NOUNTEM  =       VBUF              COUNTER FOR MIXNOUN FETCH
 0346  REF   3 LAST  19                    0112  DISTEM   =       VBUF              COUNTER FOR OCTAL DISPLAY VERBS
 0347  REF   4 LAST  19                    0112  DECTEM   =       VBUF              COUNTER FOR FETCH (DEC DISPLAY VERBS)

 0348  REF   5 LAST  19                    0113  SGNOFF   =       VBUF   +1         TEMP FOR +,- ON
 0349  REF   6 LAST  19                    0113  NVTEMP   =       VBUF   +1         TEMP FOR NVSUB
 0350  REF   7 LAST  19                    0113  SFTEMP1  =       VBUF   +1         STORAGE FOR SF CONST HI PART(=SFTEMP2-1)

 0351  REF   8 LAST  19                    0114  CODE     =       VBUF   +2         FOR DSPIN
 0352  REF   9 LAST  19                    0114  SFTEMP2  =       VBUF   +2         STORAGE FOR SF CONST LO PART(=SFTEMP1+1)
 0353  REF  10 LAST  19                    0114  DXCRIT   =       VBUF    +2        ROOTPSRS CRITERION FOR ENDING ITERS HI

 0354  REF  11 LAST  19                    0115  MIXTEMP  =       VBUF   +3         FOR MIXNOUN DATA
R0355  ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.
 0356  REF  12 LAST  19                    0115  SIGNRET  =       VBUF   +3         RETURN FOR +,- ON
 0357  REF  13 LAST  19                    0115  DXCRIT+1 =       VBUF    +3        ROOTPSRS CRITERION FOR ENDING ITERS LO

 0358  REF  14 LAST  19                    0116  ROOTPS   =       VBUF   +4         ROOTPSRS ROOT HI ORDER

 0359  REF  15 LAST  19                    0117  ROOTPS+1 =       VBUF   +5         ROOTPSRS ROOT LO ORDER
```

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```
0360                          0120    0122  BUF       ERASE  +2          TEMPORARY SCALAR STORAGE.
0361  REF   1                         0120  INDEXLOC  EQUALS BUF        CONTAINS ADDRESS OF SPECIFIED INDEX.
0362  REF   2 LAST  20                0120  SWWORD    EQUALS BUF        ADDRESS OF SWITCH WORD.

0363  REF   3 LAST  20                0121  SWBIT     EQUALS BUF +1     SWITCH BIT WITHIN SWITCH WORD.

0364  REF   4 LAST  20                0122  RETROOT   =      BUF   +2   ROOTPSRS RETURN ADDRESS OF USER

0365                          0123    0124  BUF2      ERASE  +1

0366                          0125    0125  MPTEMP    ERASE            TEMPORARY USED IN MULTIPLY AND SHIFT
0367  REF   1                         0125  DMPNTEMP  =      MPTEMP    DMPNSUB TEMPORARY

0368                          0126    0126  DOTINC    ERASE            COMPONENT INCREMENT FOR DOT SUBROUTINE.
0369  REF   1                         0126  DVSIGN    EQUALS DOTINC     DETERMINES SIGN OF DDV RESULT.
0370  REF   2 LAST  20                0126  ESCAPE    EQUALS DOTINC     USED IN ARCSIN/ARCCOS.
0371  REF   3 LAST  20                0126  ENTRET    =      DOTINC     EXIT FROM ENTER

0372                          0127    0127  DOTRET    ERASE            RETURN FROM DOT SUBROUTINE.
0373  REF   1                         0127  DVNORMCT  EQUALS DOTRET     DIVIDEND NORMALIZATION COUNT IN DDV.
0374  REF   2 LAST  20                0127  ESCAPE2   EQUALS DOTRET     ALTERNATE ARCSIN/ARCCOS SWITCH.
0375  REF   3 LAST  20                0127  WDCNT     =      DOTRET     CHAR COUNTER FOR DSPWD
0376  REF   4 LAST  20                0127  INREL     =      DOTRET     INPUT BUFFER SELECTOR ( X,Y,Z, REG )

0377                          0130    0130  MATINC    ERASE            VECTOR INCREMENT IN MXV AND VXM.
0378  REF   1                         0130  MAXDVSW   EQUALS MATINC     +0 IF DP QUOTIENT IS NEAR ONE - ELSE -1.
0379  REF   2 LAST  20                0130  POLYCNT   EQUALS MATINC     POLYNOMIAL LOOP COUNTER
0380  REF   3 LAST  20                0130  DSPMMTEM  =      MATINC     DSPCOUNT SAVE FOR DSPMM
0381  REF   4 LAST  20                0130  MIXBR     =      MATINC     INDICATOR FOR MIXED OR NORMAL NOUN
0382  REF   5 LAST  20                0130  PARCNT    =      MATINC     ROOTPSRS DER TABL LOOP COUNTER

0383                          0131    0131  TEM1      ERASE            EXEC TEMP
0384  REF   1                         0131  POLYRET   =      TEM1
0385  REF   2 LAST  20                0131  DSREL     =      TEM1       REL ADDRESS FOR DSPIN
0386  REF   3 LAST  20                0131  DERPTR    =      TEM1       ROOTPSRS DER TABL POINTER

R0387          THE FOLLOWING 10 REGISTERS ARE USED FOR TEMPORARY STORAGE OF THE DERIVATIVE COEFFICIENT TABLE OF
R0389  SUBROUTINE ROOTPSRS.  THEY MUST REMAIN WITHOUT INTERFERENCE WITH ITS SUBROUTINES WHICH ARE POWRSERS (POLY),
R0391  DMPSUB, DMPNSUB, SHORTMP, DDV/BDDV, ABS, AND USPRCADR.

0392                          0132    0132  TEM2      ERASE            EXEC TEMP
0393  REF   1                         0132  DSMAG     =      TEM2       MAGNITUDE STORE FOR DSPIN
0394  REF   2 LAST  20                0132  IDADDTEM  =      TEM2       MIXNOUN INDIRECT ADDRESS STORAGE
0395  REF   1                         0132  DERCOF-8  =      MPAC  -12  ROOTPSRS DER COF N-4 HI ORDER

0396                          0133    0133  TEM3      ERASE            EXEC TEMP
0397  REF   1                         0133  COUNT     =      TEM3       FOR DSPIN
0398  REF   2 LAST  20                0133  DERCOF-7  =      MPAC  -11  ROOTPSRS DER COF N-4 LO ORDER

0399                          0134    0134  TEM4      ERASE            EXEC TEMP
```

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```
0400  REF  1                    0134  LSTPTR   =  TEM4          LIST POINTER FOR GRABUSY
0401  REF  2 LAST 21            0134  RELRET   =  TEM4          RETURN FOR RELDSP
0402  REF  3 LAST 21            0134  FREERET  =  TEM4          RETURN FOR FREEDSP
0403  REF  3 LAST 20            0134  DERCOF-6 =  MPAC   -10    ROOTPSRS DER COF N-3 HI ORDER

0404                     0135    0135  TEM5     ERASE           EXEC TEMP
0405  REF  1                    0135  NOUNADD  =  TEM5          TEMP STORAGE FOR NOUN ADDRESS
0406  REF  4 LAST 21            0135  DERCOF-5 =  MPAC   -7     ROOTPSRS DER COF N-3 LO ORDER

0407                     0136    0136  NNADTEM  ERASE           TEMP FOR NOUN ADDRESS TABLE ENTRY
0408  REF  5 LAST 21            0136  DERCOF-4 =  MPAC   -6     ROOTPSRS DER COF N-2 HI ORDER

0409                     0137    0137  NNTYPTEM ERASE           TEMP FOR NOUN TYPE TABLE ENTRY
0410  REF  6 LAST 21            0137  DERCOF-3 =  MPAC   -5     ROOTPSRS DER COF N-2 LO ORDER

0411                     0140    0140  IDAD1TEM ERASE           TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0412                                                          MUST = IDAD2TEM-1, = IDAD3TEM-2.
0413  REF  7 LAST 21            0140  DERCOF-2 =  MPAC   -4     ROOTPSRS DER COF N-1 HI ORDER

0414                     0141    0141  IDAD2TEM ERASE           TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0415                                                          MUST = IDAD1TEM+1, = IDAD3TEM-1.
0416  REF  8 LAST 21            0141  DERCOF-1 =  MPAC   -3     ROOTPSRS DER COF N-1 LO ORDER

0417                     0142    0142  IDAD3TEM ERASE           TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
A0418                                                          MUST = IDAD1TEM+2, = IDAD2TEM+1.
0419  REF  9 LAST 21            0142  DERCOFN  =  MPAC   -2     ROOTPSRS DER COF N   HI ORDER

0420                     0143    0143  RJTMXTEM ERASE           TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)
0421  REF 10 LAST 21            0143  DERCOF+1 =  MPAC   -1     ROOTPSRS DER COF N   LO ORDER

R0422        STORAGE USED BY THE EXECUTIVE.

0423                     0144    0152  MPAC     ERASE  +6       MULTI-PURPOSE ACCUMULATOR.
0424                     0153    0153  MODE     ERASE           +1 FOR TP, +0 FOR DP, OR -1 FOR VECTOR.
0425                     0154    0154  LOC      ERASE           LOCATION ASSOCIATED WITH JOB.
0426                     0155    0155  BANKSET  ERASE           USUALLY CONTAINS BBANK SETTING.
0427                     0156    0156  PUSHLOC  ERASE           WORD OF PACKED INTERPRETIVE PARAMETERS.
0428                     0157    0157  PRIORITY ERASE           PRIORITY OF PRESENT JOB AND WORK AREA.

0429                     0160    0267          ERASE  +71D      SEVEN SETS OF 12 REGISTERS EACH.
```

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P0430 THE FOLLOWING REGISTERS ARE RESERVED FOR PINBALL

R0431 RESERVED FOR PINBALL EXECUTIVE ACTION

0432	0270	0270	DSPCOUNT	ERASE		DISPLAY POSITION INDICATOR
0433	0271	0271	DECBRNCH	ERASE		+DEC, - DEC, OCT INDICATOR
0434	0272	0272	VERBREG	ERASE		VERB CODE
0435	0273	0273	NOUNREG	ERASE		NOUN CODE
0436	0274	0274	XREG	ERASE		R1 INPUT BUFFER
0437	0275	0275	YREG	ERASE		R2 INPUT BUFFER
0438	0276	0276	ZREG	ERASE		R3 INPUT BUFFER
0439	0277	0277	XREGLP	ERASE		LO PART OF XREG (FOR DEC CONV ONLY)
0440	0300	0300	YREGLP	ERASE		LO PART OF YREG (FOR DEC CONV ONLY)
0441	0301	0301	ZREGLP	ERASE		LO PART OF ZREG (FOR DEC CONV ONLY)
0442	0302	0302	MODREG	ERASE		MODE CODE
0443	0303	0303	DSPLOCK	ERASE		KEYBOARD/SUBROUTINE CALL INTERLOCK
0444	0304	0304	REQRET	ERASE		RETURN REGISTER FOR LOAD
0445	0305	0305	LOADSTAT	ERASE		STATUS INDICATOR FOR LOADTST
0446	0306	0306	CLPASS	ERASE		PASS INDICATOR CLEAR
0447	0307	0307	NOUT	ERASE		ACTIVITY COUNTER FOR DSPTAB
0448	0310	0310	NOUNCADR	ERASE		MACHINE CADR FOR NOUN
0449	0311	0311	MONSAVE	ERASE		N/V CODE FOR MONITOR, (= MONSAVE1-1)
0450	0312	0312	MONSAVE1	ERASE		NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
0451	0313	0326	DSPTAB	ERASE	+11D	0-10D, DISPLAY PANEL BUFF. 11D, C/S LTS.
0452	0327	0327	CADRSTOR	ERASE		ENDIDLE STORAGE
0453	0330	0330	GRABLOCK	ERASE		INTERNAL INTERLOCK FOR DISPLAY SYSTEM
0454	0331	0331	NVQTEM	ERASE		NVSUB STORAGE FOR CALLING ADDRESS
A0455						MUST = NVBNKTEM-1
0456	0332	0332	NVBNKTEM	ERASE		NVSUB STORAGE FOR CALLING BANK
A0457						MUST = NVQTEM+1
0458	0333	0335	DSPLIST	ERASE	+2	WAITING LIST FOR DSP SYST INTERVAL USE
0459	0336	0336	EXTVBACT	ERASE		EXTENDED VERB ACTIVITY INTERLOCK
0460	0337	0341	DSPTEM1	ERASE	+2	BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
0461	0342	0344	DSPTEM2	ERASE	+2	BUFFER STORAGE AREA 2 (MOSTLY FOR DEC)

R0462 END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION

R0463 RESERVED FOR PINBALL INTERRUPT ACTION

0464	0345	0345	DSPCNT	ERASE		COUNTER FOR DSPOUT
A0465						RECEPTION OF A BAD MESSAGE IN JPLINK)

R0466 END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 12

```
P0467   ASSIGNMENTS FOR T4RUPT PROGRAM

 0468                           0346    0346  T4LOC     ERASE
 0469                           0347    0347  DSRUPTSW  ERASE
 0470                           0350    0350  DIDFLG    ERASE
 0471                           0351    0352  ALT       ERASE  +1
 0472                           0353    0353  ALTRATE   ERASE
 0473                           0354    0355  FINALT    ERASE  +1          (MAY NOT BE REQUIRED FOR FLIGHTS).
 0474                           0356    0356  LGYRO     ERASE
 0475                           0357    0357  FORVEL    ERASE
 0476                           0360    0360  LATVEL    ERASE
 0477                           0361    0361  LASTYCMD  ERASE
 0478                           0362    0362  LASTXCMD  ERASE

 0479                           0363    0364  ALTSAVE   ERASE  +1
R0480   END OF T4RUPT ASSIGNMENTS



 0481                           0365    0365  IMODES30  ERASE
 0482                           0366    0366  IMODES33  ERASE
 0483                           0367    0372  MODECADR  ERASE  +3
 0484   REF   1                         0367  IMUCADR   EQUALS MODECADR
 0485   REF   2 LAST  23                0370  AOTCADR   EQUALS MODECADR +1
 0486   REF   1                         0370  OPTCADR   EQUALS AOTCADR
 0487   REF   3 LAST  23                0371  RADCADR   EQUALS MODECADR +2
 0488   REF   4 LAST  23                0372  ATTCADR   EQUALS MODECADR +3

 0489                           0373    0373  MARKSTAT  ERASE
 0490                           0374    0374  XYMARK    ERASE
 0491                           0375    0375  DB        ERASE

R049102 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967******************

 049106                         0376    0376  /TEMP1/   ERASE

 049107                         0377    0377  SMARTFLG  ERASE                ANY PNZ VALUE REQUESTS SMARTJOB.
R049108 **END CODING FOR MODULE 3 REMAKE, AUGUST 1967****END CODING FOR MODULE  3 REMAKE, AUGUST 1967******************

 0492                                   0400          SETLOC 400

 0493                           0400    0402  THETAD    ERASE  +2
 0494                           0403    0410  DELVX     ERASE  +5



R0495           DOWNLINK LIST ADDRESS.
 0496                           0411    0411  DNLSTADR  ERASE

R0497   RADAR ERASABLE
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 13

```
0498                        0412    0412  RADMODES ERASE
0499                        0413    0413  SAMPLIM  ERASE
0500                        0414    0415  SAMPLSUM ERASE  +1
0501  REF  1                        0414  SAMPSUM  EQUALS SAMPLSUM
0502                        0416    0417  OPTYHOLD ERASE  +1
0503                        0420    0421  TIMEHOLD ERASE  +1
0504  REF  2 LAST  24               0414  RTARGET  EQUALS SAMPLSUM      HALF UNIT VECTOR IN SM OR NB AXES.
0505                        0422    0423  TANG     ERASE  +1            DESIRED TRUNNION AND SHAFT ANGLES.
0506  REF  1                        0422  MODEA    EQUALS TANG
0507                        0424    0425  MODEB    ERASE  +1            DODES CLOBBERS TANG +2.
0508  REF  1                        0424  NSAMP    EQUALS MODER
0509                        0426    0426  DESRET   ERASE
0510  REF  1                        0426  OLDATAGD EQUALS DESRET        USED IN DATA READING ROUTINES.
0511                        0427    0427  DESCOUNT ERASE
R0512 END OF RADAR ERASABLE ASSIGNMENTS

0513                        0430    0430  VAC1USE  ERASE
0514                        0431    0503  VAC1     ERASE  +42D
0515                        0504    0504  VAC2USE  ERASE
0516                        0505    0557  VAC2     ERASE  +42D
0517                        0560    0560  VAC3USE  ERASE
0518                        0561    0633  VAC3     ERASE  +42D
0519                        0634    0634  VAC4USE  ERASE
0520                        0635    0707  VAC4     ERASE  +42D
0521                        0710    0710  VAC5USE  ERASE
0522                        0711    0763  VAC5     ERASE  +42D

0523                        0764    0764  PHASENUM ERASE

0524                        0765    0765  1/PIPADT ERASE                TIME BASE OR DT FOR IMU COMP IN C.S.
0525  REF  1                        0765  OLDBT1   EQUALS 1/PIPADT      ADJACENT TO PHASENUM FOR DOWNLINK.


R0526 CALCMANU-DAP INTERFACE:

0527                        0766    0770  CDUXD    ERASE  +2            CDU DESIRED REGISTERS:
0528  REF  1                        0767  CDUYD    EQUALS CDUXD +1      SCALED AT PI RADIANS (180 DEGREES)
0529  REF  2 LAST  24               0770  CDUZD    EQUALS CDUXD +2      (STORED IN 2' COMPLEMENT)

0530                        0771    0773  DELCDUX  ERASE  +2            NEGATIVE OF DESIRED 100MS CDU INCREMENT:
0531  REF  1                        0772  DELCDUY  EQUALS DELCDUX +1    SCALED AT PI RADIANS (180 DEGREES)
0532  REF  2 LAST  24               0773  DELCDUZ  EQUALS DELCDUX +2    (STORED IN 2' COMPLEMENT)

0533                        0774    0776  OMEGAPD  ERASE  +2            ATTITUDE MANEUVER DESIRED RATES
0534  REF  1                        0775  OMEGAQD  EQUALS OMEGAPD +1    (NOT EXPLICITLY REFERENCED IN SYS CNTRL)
0535  REF  2 LAST  24               0776  OMEGARD  EQUALS OMEGAPD +2    SCALED AT PI/4 RADIANS/SECOND

0536                              1000            SETLOC 1000
0537                        1000    1001  T5ADR    ERASE  +1            GENADR OF NEXT LM DAP T5RUPT. * 2CADR *
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 14

A0538					BBCON OF NXT LM DAP T5RUPT. * 2CADR *
0539	1002	1003	T6NEXT	ERASE +1	LIST OF TIME6 DT-5 FOR JET LIST PROGRAM
0540	1004	1006	T6NEXTJT	ERASE +2	LIST OF JET POLICIES FOR JTLST PROGRAM
0541	1007	1007	DELAYCTR	ERASE	COUNTER FOR MINIMUM IMPULSE USE OF RHC

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 15

```
P0542   ERASABLE ASSIGNMENTS FOR AVERAGE G INTEGRATOR:

 0543                          1010    1015  RN        ERASE   +5
 0544                          1016    1023  VN        ERASE   +5
 0545                          1024    1031  GDT/2     ERASE   +5
 0546                          1032    1037  UNITR     ERASE   +5
 0547                          1040    1045  UNITW     ERASE   +5
 0548                          1046    1047  RMAG      ERASE   +1
 0549   REF   1                        0403  DELV      EQUALS  DELVV
 0550                          1050    1055  RN1       ERASE   +5
 0551                          1056    1063  VN1       ERASE   +5
 0552                          1064    1071  GDT1/2    ERASE   +5
 0553                          1072    1073  AVGEXIT   ERASE   +1
 0554                          1074    1075  AVGOUTF   ERASE   +1
 0555   REF   1                        1074  DVMNEXIT  =       AVGOUTF
R0556           WAITLIST REPEAT FLAG:

 0557                          1076    1076  RUPTAGN   ERASE
 0558   REF   1                        1076  KEYTEMP2  =       RUPTAGN       TEMP FOR KEYRUPT, UPRUPT

R0559           PHASE TABLE AND RESTART COUNTER.
```

```
L       ERASABLE ASSIGNMENTS                                            USER'S OWN PAGE NO.  16

P0560   THE FOLLOWING ARE TO LOCATED IN UNSWITCHED ERRASSIBLE

R0561   TBASE(I) ARE USED IN WAITLIST RESTARTS
R0562   PHSPRDT(I) ARE USED TO STORE EITHER PRIORITY OR DELTA TIME FOR VARIABLE RESTARTS
R0564   PHASE(I) AND -PHASE(I) ARE USED TO STORE THE PHASE INFORMATION AND PHASE INFORMATION COMPLEMENTED FOR EACH OF TH
R0566   GROUPS

 0567                           1077    1077  -PHASE1   ERASE
 0568                           1100    1100  PHASE1    ERASE
 0569                           1101    1101  -PHASE2   ERASE
 0570                           1102    1102  PHASE2    ERASE
 0571                           1103    1103  -PHASE3   ERASE
 0572                           1104    1104  PHASE3    ERASE
 0573                           1105    1105  -PHASE4   ERASE
 0574                           1106    1106  PHASE4    ERASE
 0575                           1107    1107  -PHASE5   ERASE
 0576                           1110    1110  PHASE5    ERASE
 0577                           1111    1111  -PHASE6   ERASE
 0578                           1112    1112  PHASE6    ERASE

 0579                           1113    1113  TBASE1    ERASE
 0580                           1114    1114  PHSPRDT1  ERASE
 0581                           1115    1115  TBASE2    ERASE
 0582                           1116    1116  PHSPRDT2  ERASE
 0583                           1117    1117  TBASE3    ERASE
 0584                           1120    1120  PHSPRDT3  ERASE
 0585                           1121    1121  TBASE4    ERASE
 0586                           1122    1122  PHSPRDT4  ERASE
 0587                           1123    1123  TBASE5    ERASE
 0588                           1124    1124  PHSPRDT5  ERASE
 0589                           1125    1125  TBASE6    ERASE
 0590                           1126    1126  PHSPRDT6  ERASE

 0591                           1127    1127  RSTRTWRD  ERASE          EACH BIT INDICATES RESTARTABILITY OF A
A0592                                                                  PARTICULAR MISSION PHASE.
A0593                                                                    ON BIT = YES IT IS RESTARTABLE.
A0594                                                                  BIT NO. = MISSION PHASE NO.

R0595   ERASABLE FOR SINGLE PRECISION SUBROUTINES.

 0596                           1130    1130  HALFY     ERASE
 0597                           1131    1131  ROOTRET   ERASE
 0598                           1132    1132  SQRARG    ERASE
 0599   REF   1                         1130  TEMK      EQUALS HALFY
 0600   REF   1                         1131  SQ        EQUALS ROOTRET

R0601           ERASABLE ASSIGNMETNS FOR LMP ROUTINES

 0602                           1133    1142  LMPCMD    ERASE  +7      CIRCULAR BUFFER OF LAST 8 COMMANDS.
 0603                           1143    1143  LMPIN     ERASE          POINTS TO NEXT AVAILABLE INPUT SLOT.
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 17

```
0604                        1144    1144  LMPOUT    ERASE                 POINTS TO NEXT OUTPUT LOCATION IN BUFFER
0605                        1145    1145  LMPOUTT   ERASE                 INTERRIM STORAGE FOR THE ABOVE.
0606                        1146    1146  LMPRET    ERASE                 2CADR RETURN ADDRESS FOR SUBROUTINES.
0607                        1147    1147  LMPBBANK  ERASE
0608                        1150    1150  SAVDT     ERASE

0609                        1151    1152  LONGCADR  ERASE  +1             UNSWITCHED ERASABLE FOR LONGCALL
0610                        1153    1154  LONGTIME  ERASE  +1

0611                        1155    1161  CMEMORY   ERASE  +4

0612  REF   1               1155    TEMX      EQUALS CMEMORY
0613  REF   2 LAST  28      1156    TEMY      EQUALS CMEMORY +1D
0614  REF   3 LAST  28      1157    TEMZ      EQUALS CMEMORY +2D
0615  REF   4 LAST  28      1160    TEMXY     EQUALS CMEMORY +3D
0616  REF   5 LAST  28      1161    PIPAGE    EQUALS CMEMORY +4D


0617                        1162    1162  JETRESET  ERASE                 MAINTAINED BY RCSMONIT.
0618                        1163    1163  THISCH32  ERASE                 DITTO

R0619          STORAGE FOR FOR MISSION TIMER/PHASE REGISTER PAIRS.

0620                        1164    1164  MTIMER4   ERASE
0621                        1165    1165  MTIMER3   ERASE
0622                        1166    1166  MTIMER2   ERASE
0623                        1167    1167  MTIMER1   ERASE
0624                        1170    1170  MPHASE4   ERASE
0625                        1171    1171  MPHASE3   ERASE
0626                        1172    1172  MPHASE2   ERASE
0627                        1173    1173  MPHASE1   ERASE
0628                        1174    1177  MTIMER4T  ERASE  +3             RESTART STORAGE AREAS FOR THE ABOVE.
0629                        1200    1200  MDUETEMP  ERASE
0630                        1201    1201  STATECTR  ERASE                 TIMER FOR INTERNAL STATE VECTOR UPDATES.

0631                        1202    1202  UPPHASE   ERASE                 NEW PHASE AS SENT UP THE UPLINK.
0632                        1203    1203  UPDT      ERASE                 NEW DT AS SENT UP THE UPLINK.
0633                        1204    1204  UPINDEX   ERASE                 INDEX OF TIMER MODIFIED BY UPLINK.
0634                        1205    1206  UPGET     ERASE  +1             GET FOR UPLINK REQUEST.

0635                        1207    1207  MRETURN   ERASE                 RETURN REGISTER.

R0636  PMEMORY ASSIGNMENTS

0637                        1210    1335  PMEMORY   ERASE  +85D
0638  REF   1               1210    REFRRECT  EQUALS PMEMORY +00D         STATE VECTORS FOR ORBITAL INTEGRATION
0639  REF   2 LAST  28      1216    REFVRECT  EQUALS PMEMORY +06D
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 18

0640	REF 3 LAST 28		1224	DELTAV	EQUALS	PMEMORY +12D	STATE DEVIATIONS
0641	REF 4 LAST 29		1232	NJV	EQUALS	PMEMORY +18D	
0642	REF 5 LAST 29		1240	REFRCV	EQUALS	PMEMORY +24D	
0643	REF 6 LAST 29		1246	REFVCV	EQUALS	PMEMORY +30D	
0644	REF 1		1254	REFTC	=	REFTCV	
0645	REF 7 LAST 29		1254	REFTCV	EQUALS	PMEMORY +36D	
0646	REF 8 LAST 29		1256	TE	EQUALS	PMEMORY +38D	TET,TIME CORRESPONDING TO LEM STATE
0647	REF 9 LAST 29		1260	REFXKEP	EQUALS	PMEMORY +40D	ROOT TO KEPLER EQUATIONS
0648	REF 10 LAST 29		1262	REFSMMAT	EQUALS	PMEMORY +42D	TRANSFORMATION MATRIX BETWEEN SM AND REF
0649	REF 11 LAST 29		1304	PIPRETRN	EQUALS	PMEMORY +60D	
0650	REF 1		1304	TDECTEMP	EQUALS	PIPRETRN	
0651	REF 12 LAST 29		1306	PIPTIME	EQUALS	PMEMORY +62D	
0652	REF 13 LAST 29		1310	DVSELECT	EQUALS	PMEMORY +64D	
0653	REF 14 LAST 29		1311	TEVENT	EQUALS	PMEMORY +65D	
0654	REF 15 LAST 29		1320	MASS	EQUALS	PMEMORY +72D	
0655	REF 16 LAST 29		1330	CDUTEMP	EQUALS	PMEMORY +80D	VECTOR USED IN FINDCDUD
0656	REF 17 LAST 29		1322	/ACF/	EQUALS	PMEMORY +74D	
0657	REF 18 LAST 29		1324	/AF/	EQUALS	PMEMORY +76D	
0658	REF 19 LAST 29		1323	PCNTF	EQUALS	PMEMORY +75D	
0659	REF 20 LAST 29		1326	STATIME	EQUALS	PMEMORY +78D	DP DOWNLINK TIME-DONT VIOLATE THESE REGS
0660		1336	1336	SLOSHCTR	ERASE		ERASABLE USED BY GIMBLMON FOR A COUNTR
0661		1337	1337	STARTDVC	ERASE		VALUE FOR DVCNTR FOR ENGINE ON ←
0662		1340	1340	STOPDVC	ERASE		VALUE FOR DVCNTR FOR ENGINE OFF
0663		1341	1341	SETDVCNT	ERASE		CONTENTS WILL BE LOADED INTO DVCNTR
0664		1342	1342	RSDTTEMP	ERASE		SP TEMP USED FOR RESTART DT'S.
0665		1343	1344	TPRELTER	ERASE	+1	TIME OF PRELAUNCH TERMINATION
0666		1345	1345	DAPOFFDT	ERASE		TIME FROM TIG+26 IN MP11 TO TURN DAP OFF
0667		1346	1346	OLDDVSEL	ERASE		

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 19

```
P0668   ASSIGNMENTS RESERVED EXCLUSIVELY FOR SELF-CHECK

0669                        1353    1377  SELFERAS ERASE  1353 - 1377
0670                                1353  ERESTORE EQUALS 1353
0671                                1354  SELFRET  EQUALS 1354
0672                                1355  SMODE    EQUALS 1355
0673                                1356  REDOCTR  EQUALS 1356          DO NOT CHANGE THE ORDER OF REGISTERS RE-
0674                                1357  SFAIL    EQUALS 1357          DOCTR THRU SCOUNT (NOUNS AND DOWNLINK).
0675                                1360  FAILREG  EQUALS 1360
0676                                1363  ALMCADR  EQUALS 1363
0677                                1365  ERCOUNT  EQUALS 1365
0678                                1366  SCOUNT   =      1366
0679                                1371  SKEEP1   =      1371
0680                                1372  SKEEP2   =      1372
0681                                1373  SKEEP3   =      1373
0682                                1374  SKEEP4   =      1374
0683                                1375  SKEEP5   =      1375
0684                                1376  SKEEP6   =      1376
0685                                1377  SKEEP7   =      1377

R0686   WAITLIST TASK LISTS

0687                        E3,1400       SETLOC 1400

0688                E3,1400 E3,1407 LST1  ERASE  +7               DELTA T'S.
0689                E3,1410 E3,1431 LST2  ERASE  +17D             2CADR TASK ADDRESSES.

0690                E3,1432 E3,1433 LONGBASE ERASE +1             ERASABLE FOR LONGCALL
0691                E3,1434 E3,1435 LONGEXIT ERASE +1

R0692           IMU COMPENSATION PARAMETERS:

0693                E3,1436 E3,1436 PBIASX   ERASE                PIPA BIAS AND PIPA SCALE FACTOR TERMS
0694    REF  1              E3,1436 PIPABIAS =      PBIASX            INTERMIXED.
0695                E3,1437 E3,1437 PIPASCFX ERASE
0696    REF  1              E3,1437 PIPASCF  =      PIPASCFX
0697                E3,1440 E3,1440 PBIASY   ERASE
0698                E3,1441 E3,1441 PIPASCFY ERASE
0699                E3,1442 E3,1442 PBIASZ   ERASE
0700                E3,1443 E3,1443 PIPASCFZ ERASE

0701                E3,1444 E3,1444 NBDX     ERASE                GYRO BIAS DRIFTS
0702    REF  1              E3,1444 GBIASX   =      NBDX
0703                E3,1445 E3,1445 NBDY     ERASE
0704                E3,1446 E3,1446 NBDZ     ERASE

0705                E3,1447 E3,1447 ADIAX    ERASE                ACCELERATION SENSITIVE DRIFT ALONG THE
0706                E3,1450 E3,1450 ADIAY    ERASE                   INPUT AXIS
0707                E3,1451 E3,1451 ADIAZ    ERASE
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 20

```
0708                    E3,1452  E3,1452  ADSRAX   ERASE          ACCELERATION SENSITIVE DRIFT ALONG THE
0709                    E3,1453  E3,1453  ADSRAY   ERASE              SPIN REFERENCE AXIS
0710                    E3,1454  E3,1454  ADSRAZ   ERASE

0711                    E3,1455  E3,1462  GCOMP    ERASE  +5      CONTAINS COMPENSATING TORQUES

0712                    E3,1463  E3,1463  GCOMPSW  ERASE
0713  REF   1                    E3,1455  COMMAND  EQUALS GCOMP
0714  REF   2 LAST  31           E3,1460  CDUIND   EQUALS GCOMP +3

R0715          STORAGE FOR RR TASKS.

0716                    E3,1464  E3,1464  RRRET    ERASE
0717                    E3,1465  E3,1465  RDES     ERASE
0718                    E3,1466  E3,1466  RRINDEX  ERASE

R0719  AOT CALIBRATIONS IN AZIMUTH AND ELEVATION AT DETENTS
0720                    E3,1467  E3,1471  AOTAZ    ERASE  +2
0721                    E3,1472  E3,1474  AOTEL    ERASE  +2
R0722          ASSIGNMENTS FOR PRESENTLY UNUSED NOUNS.
0723                             E3,1475  AZANG    EQUALS         DELETE WHEN OPTICAL TRACKER NOUNS GONE.
0724                             E3,1475  ELANG    EQUALS
0725                             E3,1475  DESLOTSY EQUALS
0726                             E3,1475  DESLOTSX EQUALS

0727                    E3,1475  E3,1477  ROLL     ERASE  +2
0728                    E3,1500  E3,1505  LANDMARK ERASE  +5

R0729  THE FOLLOWING REGS ARE USED BY THE STANDBY VERBS

0730                    E3,1506  E3,1507  TIMESAV  ERASE  +1
0731                    E3,1510  E3,1511  SCALSAV  ERASE  +1
0732                    E3,1512  E3,1513  TIMAR    ERASE  +1
0733                    E3,1514  E3,1515  TIMEDIFF ERASE  +1

R0734  THE FOLLOWING MAY BE PLACED IN SWITCHED ERRASIBLE

R0735  PHSNAME(I) AND PHSBB(I) STORE THE 2CADR FOR VARIABLE RESTARTS FOR EACH OF THE GROUPS
0737                    E3,1516  E3,1516  PHSNAME1 ERASE
0738                    E3,1517  E3,1517  PHSBB1   ERASE
0739                    E3,1520  E3,1520  PHSNAME2 ERASE
0740                    E3,1521  E3,1521  PHSBB2   ERASE
0741                    E3,1522  E3,1522  PHSNAME3 ERASE
0742                    E3,1523  E3,1523  PHSBB3   ERASE
0743                    E3,1524  E3,1524  PHSNAME4 ERASE
0744                    E3,1525  E3,1525  PHSBB4   ERASE
0745                    E3,1526  E3,1526  PHSNAME5 ERASE
0746                    E3,1527  E3,1527  PHSBB5   ERASE
0747                    E3,1530  E3,1530  PHSNAME6 ERASE
0748                    E3,1531  E3,1531  PHSBB6   ERASE
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 21

0749				E3,1532	E3,1534	BCDU	ERASE +2
0750				E3,1535	E3,1556	MIS	ERASE +17D
0751				E3,1557	E3,1600	MFS	ERASE +17D
0752				E3,1601	E3,1622	TMIS	ERASE +17D
0753	REF	1			E3,1601	TMFI	EQUALS TMIS
0754				E3,1623	E3,1630	COF	ERASE +5
0755				E3,1631	E3,1631	CPHI	ERASE
0756				E3,1632	E3,1632	CTHETA	ERASE
0757				E3,1633	E3,1633	CPSI	ERASE
0758	REF	1			E3,1557	MFI	EQUALS MFS
0759				E3,1634	E3,1641	COFSKEW	ERASE +5
0760				E3,1642	E3,1643	AM	ERASE +1
0761	REF	2 LAST	32		E3,1601	MFISYM	EQUALS TMIS
0762				E3,1644	E3,1645	CAM	ERASE +1
0763	REF	1			E3,1607	C2SQP	EQUALS K2
0764	REF	2 LAST	32		E3,1611	C2SQM	EQUALS K2 +2
0765	REF	3 LAST	32		E3,1613	C2PP	EQUALS K2 +4
0766	REF	1			E3,1615	C2MP	EQUALS K3
0767	REF	2 LAST	32		E3,1617	C1PP	EQUALS K3 +2
0768	REF	3 LAST	32		E3,1621	C1MP	EQUALS K3 +4
0769	REF	1			E3,1601	P21	EQUALS K1
0770	REF	2 LAST	32		E3,1603	D21	EQUALS K1 +2
0771	REF	3 LAST	32		E3,1605	G21	EQUALS K1 +4
0772				E3,1646	E3,1647	RAD	ERASE +1
0773				E3,1650	E3,1651	RSQ	ERASE +1
0774	REF	2 LAST	32		E3,1557	E1	EQUALS MFS
0775	REF	3 LAST	32		E3,1565	E2	EQUALS MFS +6
0776	REF	1			E3,1634	IG	EQUALS COFSKEW
0777	REF	3 LAST	32		E3,1615	OGF	EQUALS TMIS +12D
0778	REF	4 LAST	32		E3,1601	K1	EQUALS TMIS
0779	REF	5 LAST	32		E3,1607	K2	EQUALS TMIS +6
0780	REF	6 LAST	32		E3,1615	K3	EQUALS TMIS +12D
0781	REF	4 LAST	32		E3,1557	KEL	EQUALS MFS
0782				E3,1652	E3,1652	RATEINDX	ERASE
0783				E3,1653	E3,1653	SPNDX	ERASE
0784				E3,1654	E3,1654	MYNDX	ERASE
0785	REF	2 LAST	32		E3,1634	BRATE	EQUALS COFSKEW
0786	REF	1			E3,1644	TM	EQUALS CAM
0787	REF	7 LAST	32		E3,1601	NCDU	EQUALS TMIS
0788	REF	8 LAST	32		E3,1604	NEXTIME	EQUALS TMIS +3
0789	REF	3 LAST	24		0771	DELDCDJ	EQUALS DELCDUX
0790	REF	1			0772	DELDCDJ1	EQUALS DELCDUY
0791	REF	1			0773	DELDCDJ2	EQUALS DELCDUZ
0792	REF	9 LAST	32		E3,1605	TTEMP	EQUALS TMIS +4
0793				E3,1655	E3,1662	POINTVSM	ERASE +5
0794				E3,1663	E3,1670	SCAXIS	ERASE +5
0797				E3,1671	E3,1672	TF	ERASE +1
0798				E3,1673	E3,1674	COGAVAIL	ERASE +1
0799				E3,1675	E3,1677	SPLOC	ERASE +2
0800				E3,1700	E3,1705	JNR1	ERASE +5

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 22

```
0801                    E3,1706  E3,1713  RDVEC    ERASE  +5
0802  REF  1                    E4,1723  VDVEC    EQUALS VDVECT
0803                    E3,1714  E3,1721  UNORM    ERASE  +5
0804                    E3,1722  E3,1723  INDEP    ERASE  +1
0805                    E3,1724  E3,1725  TWEEKIT  ERASE  +1
0806                    E3,1726  E3,1727  DEPVAR   ERASE  +1
0807                    E3,1730  E3,1731  PREVDEP  ERASE  +1
0808                    E3,1732  E3,1733  DELDEP   ERASE  +1
0809                    E3,1734  E3,1735  DELINDEP ERASE  +1
0810                             0026     MININDEP EQUALS 22D
0811                             0032     MAXINDEP EQUALS 26D
R0812  RESTRTCS-RESTRTCS +77D IS USED FOR RESTART PROTECTION DURING PRELAUNCH

0813                             E3,1600  RESTRTCS =      1600

A0814                                                    ERASABLE FOR MISSION PHASE TWO
0815                    E3,1736  E3,1737  TGRR     ERASE  +1        TIME OF GUIDANCE REFERENCE RELEASE
0816                    E3,1740  E3,1741  TLIFTOFF ERASE  +1        TIME OF LIFTOFF
0817                    E3,1742  E3,1742  DT-LIFT  ERASE           DT FROM GRR TO LIFTOFF
0818  REF  1                    E3,1742  ABORTNDX EQUALS DT-LIFT
0819                    E3,1743  E3,1744  DT-LETJT ERASE  +1        DT FROM LIFTOFF TO POST-LET JETTISON
0820                    E3,1745  E3,1746  AZGR     ERASE  +1        PAD 37B VERTICAL TO REF X-Z PLANE.
0821                    E3,1747  E3,1750  TILT     ERASE  +1        Y ABOUT Z IN REVS.
0822                    E3,1751  E3,1752  ZSMAZ    ERASE  +1        Z FROM NORTH IN REVS.
0823                    E3,1753  E3,1755  TEPHEM   ERASE  +2        TP CS FROM 00:00:00 JULY 1 TO 00:00:00
0824                    E3,1756  E3,1757  AZO      ERASE  +1        ANGLE BETWEEN GREENWICH AND X-Z PLANE
0825                    E3,1760  E3,1761  P37BLAT  ERASE  +1        LAUNCH PAD LATITUDE
0826                    E3,1762  E3,1763  P37BLONG ERASE  +1        LAUNCH PAD LONGITUDE
A0827                                                    OF LAUNCH DAY.
0828                    E3,1764  E3,1771  DELVBUF  ERASE  +5        HOLDS VEL CORR WHEN L/O CAUGHT BY DVMON.
0829  REF  1                    E3,1764  GLIFTOFF EQUALS DELVBUF    WRITTEN OVER VIA DELVBUF AFTER GRR SET


0830                    E3,1772  E3,1772  MP6TO7   ERASE           ERASABLE FOR MP6
0831                    E3,1773  E3,1773  MP8TO9   ERASE           ERASABLE FOR MISSION PHASE 8

08315                   E3,1774  E3,1775  RSBBQ    ERASE  +1        WILL BE FILLED WITH BB AND Q ON RESTART.
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 23

P0832 ERASABLE ASSIGNMENTS FOR EBANK 4

```
0833                                E4,1400          SETLOC 2000

0834                        E4,1400 E4,1626  AMEMORY ERASE +150D
R0835          THE FOLLOWING A MEMORY LOCATIONS ARE USED BY MID-COURSE NAVIGATION

R0837  CAUTION: ORBITAL INTEGRATION REGISTERS RAVEGON, VAVEGON AND SECOND DPS GUIDANCE REGISTERS TPIP, TTF/4,
R0839  TTF/4TMP, TULLG ARE ALL IN USE SIMULTANEOUSLY AND MUST NOT CONFLICT.

0840  REF   1                 E4,1400  RRECT    EQUALS AMEMORY +000D
0841  REF   2 LAST  34        E4,1400  RIGNTION EQUALS AMEMORY +000D
0842  REF   3 LAST  34        E4,1406  VRECT    EQUALS AMEMORY +006D
0843  REF   4 LAST  34        E4,1406  VIGNTION EQUALS AMEMORY +006D
0844  REF   5 LAST  34        E4,1414  TDELTAV  EQUALS AMEMORY +012D
0845  REF   6 LAST  34        E4,1414  NEWDLTAV EQUALS AMEMORY +012D
0846  REF   7 LAST  34        E4,1422  TNUV     EQUALS AMEMORY +018D
0847  REF   8 LAST  34        E4,1422  NEWNUV   EQUALS AMEMORY +018D
0848  REF   9 LAST  34        E4,1430  RCV      EQUALS AMEMORY +024D
0849  REF  10 LAST  34        E4,1430  FOUNDR   EQUALS AMEMORY +024D
0850  REF  11 LAST  34        E4,1436  VCV      EQUALS AMEMORY +030D
0851  REF  12 LAST  34        E4,1436  FOUNDV   EQUALS AMEMORY +030D
0852  REF  13 LAST  34        E4,1444  TC       EQUALS AMEMORY +036D
0853  REF  14 LAST  34        E4,1446  TET      EQUALS AMEMORY +038D
0854  REF  15 LAST  34        E4,1450  XSEP     EQUALS AMEMORY +040D
0855  REF  16 LAST  34        E4,1452  ALPHAV   EQUALS AMEMORY +042D
0856  REF  17 LAST  34        E4,1452  DELR     EQUALS AMEMORY +042D
0857  REF  18 LAST  34        E4,1460  BETAV    EQUALS AMEMORY +048D
0858  REF  19 LAST  34        E4,1460  DELVEL   EQUALS AMEMORY +048D
0859  REF  20 LAST  34        E4,1466  PHIV     EQUALS AMEMORY +054D
0860  REF  21 LAST  34        E4,1466  BVECTOR  EQUALS AMEMORY +054D
0861  REF  22 LAST  34        E4,1474  PSIV     EQUALS AMEMORY +060D
0862  REF  23 LAST  34        E4,1502  FV       EQUALS AMEMORY +066D

0863  REF  24 LAST  34        E4,1510  VECTAB   EQUALS AMEMORY +072D

0864  REF  25 LAST  34        E4,1510  TAVEGON  EQUALS AMEMORY +072D
0865  REF  26 LAST  34        E4,1512  TRESUME  EQUALS AMEMORY +074D
0866  REF  27 LAST  34        E4,1514  RAVEGON  EQUALS AMEMORY +076D   SEE CAUTION ABOVE
0867  REF  28 LAST  34        E4,1522  VAVEGON  EQUALS AMEMORY +082D   SEE CAUTION ABOVE
0868  REF  29 LAST  34        E4,1530  RIG-2SEC EQUALS AMEMORY +088D
0869  REF  30 LAST  34        E4,1554  ALPHAM   EQUALS AMEMORY +108D
0870  REF  31 LAST  34        E4,1556  BETAM    EQUALS AMEMORY +110D
0871  REF  32 LAST  34        E4,1560  TAU      EQUALS AMEMORY +112D
0872  REF  33 LAST  34        E4,1560  GIVENT   EQUALS AMEMORY +112D
0873  REF  34 LAST  34        E4,1562  DT/2     EQUALS AMEMORY +114D
0874  REF  35 LAST  34        E4,1564  H        EQUALS AMEMORY +116D
0875  REF  36 LAST  34        E4,1566  TDEC     EQUALS AMEMORY +118D
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 24

```
0876  REF  1                    E4,1566  ENGOFFDT EQUALS TDEC
0877  REF  37 LAST  34          E4,1570  FBRANCH  EQUALS AMEMORY +120D
0878  REF  38 LAST  35          E4,1571  HBRANCH  EQUALS AMEMORY +121D
0879  REF  39 LAST  35          E4,1572  GMODE    EQUALS AMEMORY +122D
0880  REF  40 LAST  35          E4,1573  QREADY   EQUALS AMEMORY +123D
0881  REF  41 LAST  35          E4,1574  MEASQ    EQUALS AMEMORY +124D
0882  REF  42 LAST  35          E4,1576  DELTAQ   EQUALS AMEMORY +126D

0883  REF  43 LAST  35          E4,1600  MEASMODE EQUALS AMEMORY +128D
0884  REF  44 LAST  35          E4,1601  NVCODE   EQUALS AMEMORY +129D
0885  REF  45 LAST  35          E4,1602  MIDEXIT  EQUALS AMEMORY +130D
0886  REF  46 LAST  35          E4,1602  DSPRTRN  EQUALS AMEMORY +130D
0887  REF  47 LAST  35          E4,1603  INCORPEX EQUALS AMEMORY +131D
0888  REF  48 LAST  35          E4,1604  STEPEXIT EQUALS AMEMORY +132D
0889  REF  49 LAST  35          E4,1605  DIFEQCNT EQUALS AMEMORY +133D
0890  REF  50 LAST  35          E4,1605  NORMGAM  EQUALS AMEMORY +133D
0891  REF  51 LAST  35          E4,1606  SCALEA   EQUALS AMEMORY +134D
0892  REF  52 LAST  35          E4,1607  SCALEB   EQUALS AMEMORY +135D
0893  REF  53 LAST  35          E4,1613  YV       EQUALS AMEMORY +139D
0894  REF  54 LAST  35          E4,1621  ZV       EQUALS AMEMORY +145D
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 25

```
P0895   VARIABLES FOR SECOND DPS GUIDANCE

R0896   CAUTION: ORBITAL INTEGRATION REGISTERS RAVEGON, VAVEGON AND SECOND DPS GUIDANCE REGISTERS TPIP, TTF/4,
R0898   TTF/4TMP, TULLG ARE ALL IN USE SIMULTANEOUSLY AND MUST NOT CONFLICT.

R0899   2DPS PRESENTLY RECEIVES CERTAIN VARIABLES FROM THE ORBITAL INTEGRATION PROGRAM IN REGISTERS USED IN COMMON BY
R0901   THE TWO PROGRAMS. THESE VARIABLES ARE TET, RIGNTION, VIGNTION. 2DPS CAREFULLY TRANSFERS THESE VARIABLES TO
R0903   REGISTERS OF PROGRAM CALCRVG BEFORE WRITING INTO THE REGISTERS IN WHICH THESE VARIABLES ARRIVE.

R0905   SOME TIME SHARING OF 2DPS REGISTERS BY 2DPS VARIABLES HAS BEEN ARRANGED. MORE IS POSSIBLE.
R0907   BUT IT BECOMES INCREASINGLY DIFFICULT TO PROVE RESTARTABILITY.

 0908   REF  55 LAST  35          E4,1400  E2DPS    =    AMEMORY

R0909   CONTROL VARIABLES

 0910   REF   1                   E4,1400  NDX2DPS  =    E2DPS
 0911   REF   1                   E4,1401  NDXBR    =    NDX2DPS  +1
 0912   REF   1                   E4,1402  FLPASS0  =    NDXBR    +1
 0913   REF   1                   E4,1403  COUNTFC  =    FLPASS0  +1
 0914   REF   1                   E4,1404  COUNTFCT =    COUNTFC  +1
R0915
R0916   ADDRESS VARIABLES

 0917   REF   1                   E4,1405  AVGXTEMP =    COUNTFCT +1
 0918   REF   1                   E4,1406  RETNTLZ  =    AVGXTEMP +1
 0919   REF   1                   E4,1407  RETXIGN1 =    RETNTLZ  +1
 0920   REF   1                   E4,1410  RETTHRT  =    RETXIGN1 +1
R0921
R0922   COORDINATE FRAME VECTORS AND MATRICES

 0923   REF   1                   E4,1411  CLT/2    =    RETTURT  +1
R0924
R0925   TABLES

 0926   REF   1                   E4,1433  TABLTTF  =    CLT/2    +22
R0927
R0928   STATE VARIABLES

 0929   REF   1                   E4,1444  PIPTIMET =    TABLTTF  +11
 0930   REF   1                   E4,1446  TPIP     =    PIPTIMET +2      SEE CAUTION ABOVE
 0931   REF   1                   E4,1450  TPIPOLD  =    TPIP     +2
 0932   REF   1                   E4,1452  TTF/4    =    TPIPOLD  +2      SEE CAUTION ABOVE
 0933   REF   1                   E4,1454  TTF/4TMP =    TTF/4    +2      SEE CAUTION ABOVE
 0934   REF   1                   E4,1456  TULLG    =    TTF/4TMP +2      SEE CAUTION ABOVE
 0935   REF   1                   E4,1460  R        =    TULLG    +2
 0936   REF   1                   E4,1466  V        =    R        +6
 0937   REF   1                   E4,1474  VL       =    V        +6
 0938   REF   1                   E4,1502  RP2      =    VL       +6
 0939   REF   1                   E4,1504  MAP2     =    RP2      +2
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 26

```
 0940   REF   1                    E4,1506  RC       =    MAP2     +2
 0941   REF   1                    E4,1510  RS       =    RC       +2
 0942   REF   1                    E4,1510  RTEMP    =    RS
 0943   REF   2 LAST  37           E4,1516  VS       =    RS       +6
 0944   REF   1                    E4,1516  VTEMP    =    VS
 0945   REF   2 LAST  37           E4,1524  CRS2     =    VS       +6
 0946   REF   1                    E4,1526  SRS2     =    CRS2     +2
 0947   REF   1                    E4,1530  TRS2     =    SRS2     +2
 0948   REF   1                    E4,1532  ASPRT    =    TRS2     +2
 0949   REF   1                    E4,1532  GDOTM1T  =    ASPRT
R0950
R0951   AFC CALCULATION VARIABLES, QUADRATIC AND LINEAR

 0952   REF   2 LAST  37           E4,1540  ACS      =    ASPRT    +6
 0953   REF   1                    E4,1546  AFCS     =    ACS      +6
 0954   REF   1                    E4,1554  AFC      =    AFCS     +6
 0955   REF   1                    E4,1562  /AFC/     =    AFC      +6
 0956   REF   1                    E4,1564  /AFC/OLD  =    /AFC/    +2
 0957   REF   1                    E4,1566  JNAFC/2   =    /AFC/OLD +2
 0958   REF   1                    E4,1574  JNAFC/20  =    JNAFC/2  +6
 0959   REF   1                    E4,1574  ADLINS    =    JNAFC/20
 0960   REF   2 LAST  37           E4,1602  GDUMPRES  =    JNAFC/20 +6
 0961   REF   1                    E4,1602  ADELLINS  =    GDUMPRES
 0962   REF   2 LAST  37           E4,1610  GDOTM1    =    GDUMPRES +6
 0963   REF   1                    E4,1610  TTFLIN/4  =    GDOTM1
R0964
R0965   ASSIGNMENTS WITHIN THE WORK AREA

 0966                              0006  PDUM     =    6
 0967                              0010  RDUM     =    10
 0968                              0016  VDUM     =    16
 0969                              0040  ADUM     =    40        ONLY ADUM CAN USE THE AREA DESTROYED BY
 0970                              0024  JDUM     =    24        TAKING THE UNIT OF RDUM IN SUBR GDUMCL.
 0971                              0032  GDUM     =    32        PLACE GDUM TO PRESERVE /RDUM/ FOR OTHERS
R0972
R0973           COMPLETES SECOND DPS ERASABLES (EXCEPT FOR CPT6/2 WHICH IS ASSIGNED ELSEWHERE)
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 27

P0975 ERASABLES FOR ASCENT GUIDANCE

R0976 ERASABLES FOR PREAPS2

```
 0977  REF  56 LAST  36          E4,1400  PAXIS1   EQUALS AMEMORY          VECTOR
 0978  REF  57 LAST  38          E4,1406  QAXIS    EQUALS AMEMORY +6D      VECTOR
 0979  REF  58 LAST  38          E4,1414  SAXIS    EQUALS AMEMORY +12D     VECTOR
 0980  REF  59 LAST  38          E4,1422  AT       EQUALS AMEMORY +18D     DP    * DO       *
 0981  REF  60 LAST  38          E4,1424  VE       =      AMEMORY +20D     DP    * NOT      *
 0982  REF  61 LAST  38          E4,1426  T3UP     EQUALS AMEMORY +22D     DP    * CHANGE   *
 0983  REF  62 LAST  38          E4,1430  ATMEAS   =      AMEMORY +24D     VECTOR* THE ORDER *
 0984  REF  63 LAST  38          E4,1436  KR1      EQUALS AMEMORY +30D     DP    * OF       *
 0985  REF  64 LAST  38          E4,1440  RDOTD    EQUALS AMEMORY +32D     DP    * THESE    *
 0986  REF  65 LAST  38          E4,1442  YDOTD    EQUALS AMEMORY +34D     DP    * LOCATIONS*
 0987  REF  66 LAST  38          E4,1444  ZDOTD    EQUALS AMEMORY +36D     DP    **********
 0988  REF  67 LAST  38          E4,1446  RRETURN  EQUALS AMEMORY +38D     DP
 0989  REF  68 LAST  38          E4,1450  ASCRET   EQUALS AMEMORY +40D     SP
```

R0990 ERASABLES FOR ASCENT

```
 0991  REF  69 LAST  38          E4,1451  LAMPRIO   EQUALS AMEMORY +41D     SP
 0992  REF  70 LAST  38          E4,1452  TCO      EQUALS AMEMORY +42D     DP
 0993  REF  71 LAST  38          E4,1454  TREF     EQUALS AMEMORY +44D     DP
 0994  REF  72 LAST  38          E4,1456  VTO      =      AMEMORY +46D
 0995  REF  73 LAST  38          E4,1460  KR       EQUALS AMEMORY +48D     DP
 0996  REF  74 LAST  38          E4,1464  YCONS    EQUALS AMEMORY +52D     DP
 0997  REF  75 LAST  38          E4,1466  YDOT     EQUALS AMEMORY +54D     DP
 0998  REF  76 LAST  38          E4,1470  LAXIS    EQUALS AMEMORY +56D     VECTOR
 0999  REF  77 LAST  38          E4,1476  ZAXIS    EQUALS AMEMORY +62D     VECTOR
 1000  REF  78 LAST  38          E4,1504  ZDOT     EQUALS AMEMORY +68D     DP
 1001  REF  79 LAST  38          E4,1506  TIME     EQUALS AMEMORY +70D     DP
 1002  REF  80 LAST  38          E4,1510  GEFF     EQUALS AMEMORY +72D     DP
 1003  REF  81 LAST  38          E4,1512  PCONS    EQUALS AMEMORY +74D     DP
```

R1004 *** THE REGISTERS AMEMORY +76D THRU AMEMORY +87D CONTAIN RAVEGON AND VAVEGON, AND MUST NOT BE USED BY THE
R1006 ASCENT EQUATIONS. *********

```
 1007  REF  82 LAST  38          E4,1530  PRATE    EQUALS AMEMORY +88D     DP
 1008  REF  83 LAST  38          E4,1532  H1       EQUALS AMEMORY +90D     VECTOR
 1009  REF  84 LAST  38          E4,1540  TGO      =      AMEMORY +96D     DP
 1010  REF  85 LAST  38          E4,1542  TFL      =      AMEMORY +98D     DP
 1011  REF  86 LAST  38          E4,1546  RDOT     EQUALS AMEMORY +102D    DP
 1012  REF  87 LAST  38          E4,1550  RY       EQUALS AMEMORY +104D    DP
 1013  REF  88 LAST  38          E4,1552  JRCO     EQUALS AMEMORY +106D    VECTOR
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 28

R1014 ERASABLES FOR THRUST MAGNITUDE FILTER

```
 1015   REF   1                        E4,1430  1/DV1     EQUALS ATMEAS
 1016   REF   2 LAST  39               E4,1432  1/DV2     EQUALS ATMEAS +2
 1017   REF   3 LAST  39               E4,1434  1/DV3     EQUALS ATMEAS +4
 1018   REF   1                        E4,1737  RCOV      =      RD
R1019   MORE OF THESE ARE IN E7.
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 29

```
P1020   ERASABLES USED IN ORBITAL INTEGRATION

 1021                       E4,1627   E4,1627  PBODY    ERASE                 USED IN ORBITAL INTEGRATION
 1022   REF   1                      E4,1630  W        EQUALS PBODY +1       UNUSED IN 206, BUT REFERRED TO BY
A1023                                                                        ORBITAL INTEGRATION

 1024                       E4,1630   E4,1631  AVMIDRTN ERASE  +1             RETURN ADDRESS FROM AVETOMID OR MIDTOAVE


R1025   THE FOLLOWING ARE USED BY FINDCDUD

 1026                       E4,1632   E4,1637  AXISD    ERASE  +5             VECTOR
 1027                       E4,1640   E4,1645  AXIS     ERASE  +5             VECTOR
 1028                       E4,1646   E4,1653  COSCDU   ERASE  +5             VECTOR
 1029                       E4,1654   E4,1661  SINCDU   ERASE  +5             VECTOR
 1030   REF   2 LAST  29                 1304  RETSAVE  =      P1PRETRN
R1031   ERASABLES FOR MISSION PHASES 7,9,11,13

R1032   MISSION PHASE 7

 1033                       E4,1662   E4,1662  DT2TEMP  ERASE
 1034                       E4,1663   E4,1664  DT2TEMPD ERASE  +1

R1035   MISSION PHASE 9

 1036   REF   1                      E4,1662  SHJUMP1  EQUALS DT2TEMP         HOLDS ADDRESS FOR NEXT COMPUTATION
 1037                      E4,1665   E4,1666  TDI      ERASE  +1             DESCENT INJECTION CUTOFF TIME
 1038   REF   1                      E4,1663  TTHRUST  EQUALS DT2TEMPD       DPS1 MANEUVER THRUST TIME
 1039                      E4,1667   E4,1670  TIGN     ERASE  +1             DPS1 IGNITION TIME
 1040                      E4,1671   E4,1676  UNITVG   ERASE  +5             UNIT VECTOR OF VELOCITY-TO-BE-GAINED
R1041   MISSION PHASES 11 AND 13

 1042   REF   2 LAST  40             E4,1662  MPRETRN  EQUALS DT2TEMP
 1043   REF   2 LAST  40             E4,1663  DT11TEMP EQUALS DT2TEMPD
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 30

P1044 ERASABLE STORAGE FOR UPDATES - NON SHARABLE

1045			E4,1677	E4,1714	STBUFF	ERASE +15	
1046			E4,1715	E4,1715	STCOUNT	ERASE	
1047			E4,1716	E4,1716	UPOLDMOD	ERASE	
1048			E4,1717	E4,1717	UPTEMP	ERASE	
1049			E4,1720	E4,1720	UPTEMP1	ERASE	
1050			E4,1721	E4,1721	UPVERB	ERASE	
1051			E4,1722	E4,1722	COMPNUMB	ERASE	

R1052 ERASABLE STORAGE FOR DOWNLINK - LIMITED SHARING POSSIBLE

1053			E4,1723	E4,1730	VDVECT	ERASE +5	VELOCITY DESIRED
1054	REF 2 LAST 33			E4,1723	DOWN2DPS	= VDVECT	
1055			E4,1731	E4,1736	VGVECT	ERASE +5	VELOCITY TO BE GAINED
1056			E4,1737	E4,1744	RD	ERASE +5	POSITION DESIRED
1057			E4,1745	E4,1746	TTGO	ERASE +1	TIME TO GO IN CENTISECONDS.

R1058 EBANK 4 NON SHARABLE ERASABLE LOAD STORAGE

1059			E4,1751	E4,1777	E4LOAD	ERASE 2351 - 2377	
1060	REF 1			E4,1751	MPDT08	EQUALS E4LOAD	DELTA TIME FROM MP7 TO MP8
1061	REF 2 LAST 41			E4,1752	MP9-11DT	EQUALS E4LOAD +1	DELTA TIME FROM MP9 TO MP11
1062	REF 3 LAST 41			E4,1753	MP11TO13	EQUALS E4LOAD +2	DELTA TIME FROM MP11 TO MP13
1063	REF 4 LAST 41			E4,1754	RP	EQUALS E4LOAD +3	DP TARGET PARAMETER FOR DPS1 BURN
1064	REF 5 LAST 41			E4,1756	CPT6/2	EQUALS E4LOAD +5	VECTOR TARGET PARAMETER FOR DPS2 BURN
1065	REF 6 LAST 41			E4,1764	RIVEC	EQUALS E4LOAD +13	VECTOR TARGET PARAMETER FOR APS2 BURN
1066	REF 7 LAST 41			E4,1772	TINT	EQUALS E4LOAD +21	DP TARGET PARAMETER FOR APS2 BURN
1067	REF 8 LAST 41			E4,1774	RCO	EQUALS E4LOAD +23	DP TARGET PARAMETER FOR APS2 BURN
1068	REF 9 LAST 41			E4,1776	TIGNTIDN	EQUALS E4LOAD +25	DP TIME OF STATE (VPATCHER).

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P1069 ERASABLES FOR MASS UPDATE (A PART OF AVERAGE G) AND THROTTLE CONTROL

R1070 INITIAL VALUES FOR MASS: THESE ERASABLES ARE SACROSANCT.

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1071                          E7,1776   E7,1777  LEMMASS2 ERASE  3776 - 3777

1072  REF  11 LAST  21                    0144  LEMMASS1 =      MPAC          *******TEMPORARY**********************

R1073 ERASABLES FOR MASS UPDATE ROUTINE

1074  REF   1                          E5,1544  VEX      =      SAVERASE +30D
1075  REF   1                          E5,1544  VEXDEX   =      VEX
1076  REF   2 LAST  42                 E5,1545  PREFORCE =      VEX +1
1077  REF   3 LAST  42                 E5,1547  VEXNOM   =      VEX +3
1078  REF   4 LAST  42                 E5,1551  DELAREA  =      VEX +5
1079  REF   5 LAST  42                 E5,1553  AREARATE =      VEX +7
1080  REF   6 LAST  42                 E5,1555  NEGVEX   =      VEX +11
1081  REF   7 LAST  42                 E5,1557  DAREATMP =      VEX +13
1082  REF   8 LAST  42                 E5,1561  MASSTEMP =      VEX +15
1083  REF   9 LAST  42                 E5,1563  MINIMASS =      VEX +17

1084  REF   2 LAST  42                 E5,1565  ETHROT   =      SAVEBASE +47D
1085  REF   1                          E5,1565  FOLD     =      ETHROT
1086  REF   2 LAST  42                 E5,1567  FCOLD    =      ETHROT +2
1087  REF   3 LAST  42                 E5,1570  FC       =      ETHROT +3
1088  REF   4 LAST  42                 E5,1572  PIF      =      ETHROT +5
1089  REF   5 LAST  42                 E5,1574  PIFPSET  =      ETHROT +7
1090  REF   6 LAST  42                 E5,1574  RTNHOLD  =      ETHROT +7
1091  REF   7 LAST  42                 E5,1576  FWEIGHT  =      ETHROT +11
```

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P1092

R1093 THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE ENTRY AND INITIALIZATION JOB OF THE FCS TEST FOR LEM.

1095 REF 89 LAST 38 E4,1400 FCSCNTR EQUALS AMEMORY +000D

R1096 THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE JETSET TASK.

R1097 (OPTIMUM PRELAUNCH A C USES JETSTEP-JETSTEP +77D FOR RESTART PROOF)

1098 REF 90 LAST 43 E4,1401 XJBUF EQUALS AMEMORY +001D
1099 REF 91 LAST 43 E4,1402 YZJBUF EQUALS AMEMORY +002D
1100 REF 92 LAST 43 E4,1403 JFBUF EQUALS AMEMORY +003D
1101 REF 93 LAST 43 E4,1404 FCNTR EQUALS AMEMORY +004D
1102 REF 94 LAST 43 E4,1405 THBUF EQUALS AMEMORY +005D
1103 REF 95 LAST 43 E4,1406 OFFTMBJF EQUALS AMEMORY +006D
1104 REF 96 LAST 43 E4,1407 JETSTEP EQUALS AMEMORY +007D
1105 REF 97 LAST 43 E4,1410 NTIMES EQUALS AMEMORY +008D
1106 REF 98 LAST 43 E4,1420 NEXTTIME EQUALS AMEMORY +016D
1107 REF 99 LAST 43 E4,1430 JETONTM EQUALS AMEMORY +024D
1108 REF 100 LAST 43 E4,1440 XJETS EQUALS AMEMORY +032D
1109 REF 101 LAST 43 E4,1450 YZJETS EQUALS AMEMORY +040D
1110 REF 102 LAST 43 E4,1460 JETOFFTM EQUALS AMEMORY +048D

R1111 THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE ENGINE ON-OFF TASK.

1112 REF 103 LAST 43 E4,1470 ENGSTEP EQUALS AMEMORY +056D
1113 REF 104 LAST 43 E4,1471 CYLTIMES EQUALS AMEMORY +057D
1114 REF 105 LAST 43 E4,1474 NEXTCYLT EQUALS AMEMORY +060D
1115 REF 106 LAST 43 E4,1477 ONTIME EQUALS AMEMORY +063D
1116 REF 107 LAST 43 E4,1502 OFFTIME EQUALS AMEMORY +066D
1117 REF 108 LAST 43 E4,1505 OFFTIMER EQUALS AMEMORY +069D

R1118 THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE TRIM TASK.

1119 REF 109 LAST 43 E4,1510 TRIMSTEP EQUALS AMEMORY +072D
1120 REF 110 LAST 43 E4,1511 NUMTIMES EQUALS AMEMORY +073D
1121 REF 111 LAST 43 E4,1525 STEPDLYT EQUALS AMEMORY +085D
1122 REF 112 LAST 43 E4,1541 TRIMONT EQUALS AMEMORY +097D
1123 REF 113 LAST 43 E4,1555 TRIMOFFT EQUALS AMEMORY +109D
1124 REF 114 LAST 43 E4,1571 TRIMIND EQUALS AMEMORY +121D

R1125 THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE THROTTLE TASK.

1126 REF 115 LAST 43 E4,1605 THRTSTEP EQUALS AMEMORY +133D
1127 REF 116 LAST 43 E4,1606 DOTIMES EQUALS AMEMORY +134D
1128 REF 117 LAST 43 E4,1614 DELAY EQUALS AMEMORY +140D
1129 REF 118 LAST 43 E4,1622 THRTIME EQUALS AMEMORY +146D
1130 REF 119 LAST 43 E4,1630 THCOMM1 EQUALS AMEMORY +152D

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 1131   REF 120 LAST  43              E4,1636  THCOMM2  EQUALS AMEMORY +158D

R1132    THE FOLLOWING ERASABLE REGISTERS ARE USED BY THE INTERFACE TOOK TASK.

 1133   REF 121 LAST  44              E4,1644  3DBUF1   EQUALS AMEMORY +164D
 1134   REF 122 LAST  44              E4,1650  3DBUF0   EQUALS AMEMORY +168D
 1135   REF 123 LAST  44              E4,1654  QUITLOOK EQUALS AMEMORY +172D
 1136   REF 124 LAST  44              E4,1655  CHCNTR   EQUALS AMEMORY +173D

 1137                                 E5,1400           SETLOC 2400
R1138   THE FOLLOWING ERASABLE LOCATIONS ARE UTILIZED BY THE IN-FLIGHT ALIGNMENT ROUTINES

 1140                     E5,1400     E5,1421  XSM      ERASE  +17D
 1141   REF   1                       E5,1406  YSM      =      XSM +6
 1142   REF   2 LAST  44              E5,1414  ZSM      =      XSM +12D
 1143                     E5,1422     E5,1443  XDC      ERASE  +17D
 1144   REF   1                       E5,1430  YDC      =      XDC +6
 1145   REF   2 LAST  44              E5,1436  ZDC      =      XDC +12D
 1146   REF   3 LAST  44              E5,1422  XNB      =      XDC
 1147   REF   4 LAST  44              E5,1430  YNB      =      XDC +6
 1148   REF   5 LAST  44              E5,1436  ZNB      =      XDC +12D
 1149                     E5,1444     E5,1465  STARAD   ERASE  +17D
 1150                     E5,1466     E5,1473  STAR     ERASE  +5
 1151                     E5,1474     E5,1475  SAC      ERASE  +1
 1152                     E5,1476     E5,1477  PAC      ERASE  +1
 1153                     E5,1500     E5,1501  OGC      ERASE  +1
 1154                     E5,1502     E5,1503  IGC      ERASE  +1
 1155                     E5,1504     E5,1505  MGC      ERASE  +1
 1156                                   0026   ZPRIME   =      22D
 1157                                   0026   PDA      =      22D
 1158                                   0020   COSTH    =      16D
 1159                                   0022   SINTH    =      18D
 1160                                   0024   THETA    =      20D
 1161                                   0040   STARM    =      32D


R1162   THE FOLLOWING ERASABLE LOCATIONS ARE UTILIZED BY THE SYSTEM TESTS

 1163                     E5,1506     E5,1507  AZIMUTH  ERASE  +1
 1164                     E5,1510     E5,1511  LATITUDE ERASE  +1

 1165                     E5,1512     E5,1512  ERDPTN   ERASE
 1166                     E5,1513     E5,1520  ERVECTOR ERASE  +5
 1167                     E5,1521     E5,1526  GYROD    ERASE  +5
 1168                     E5,1527     E5,1527  LENGTHOT ERASE
 1169                     E5,1530     E5,1535  LOSVEC   ERASE  +5
 1170                     E5,1536     E5,1536  NBPOS    ERASE
 1171                     E5,1537     E5,1537  NDXCTR   ERASE
 1172                     E5,1540     E5,1540  PIPANO   ERASE
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1173                        E5,1541  E5,1541  PIPINDEX ERASE
1174                        E5,1542  E5,1543  PIPNDX   ERASE  +1
1175                        E5,1544  E5,1544  POSITON  ERASE
1176                        E5,1545  E5,1545  QPLAC    ERASE
1177                        E5,1546  E5,1546  QPLACE   ERASE
1178                        E5,1547  E5,1547  QPLACES  ERASE
1179                        E5,1550  E5,1550  RUN      ERASE
1180                        E5,1551  E5,1551  STOREPL  ERASE
1181                        E5,1552  E5,1552  SOUTHDR  ERASE
1182                        E5,1553  E5,1560  TAZEL1   ERASE  +5
1183                        E5,1561  E5,1562  TEMPTIME ERASE  +1
1184                        E5,1563  E5,1563  TESTNO   ERASE
1185                        E5,1564  E5,1565  TMARK    ERASE  +1
1186                        E5,1566  E5,1566  SHAFTA   ERASE
1187                        E5,1567  E5,1567  TRUNA    ERASE
1188                        E5,1570  E5,1776  GENPL    ERASE  +134D

1189  REF   1               E5,1570  COUTIMEI =      GENPL
1190  REF   2 LAST  45      E5,1572  COUTIMEF =      GENPL +2
1191  REF   3 LAST  45      E5,1574  COUDANG  =      GENPL +4
1192  REF   4 LAST  45      E5,1575  COUREADF =      GENPL +5
1193  REF   5 LAST  45      E5,1576  COUREADI =      GENPL +6
1194  REF   6 LAST  45      E5,1577  COULIMIT =      GENPL +7

1195  REF   7 LAST  45      E5,1574  TEMPADD =      GENPI +4
1196  REF   8 LAST  45      E5,1575  TEMP   =      GENPL +5
1197  REF   9 LAST  45      E5,1576  NOBITS =      GENPI +6
1198  REF  10 LAST  45      E5,1577  CHAN   =      GENPL +7

1199  REF  11 LAST  45      E5,1600  LOS1   =      GENPL +8D
1200  REF  12 LAST  45      E5,1606  LOS2   =      GENPI +14D

1201  REF  13 LAST  45      E5,1614  CALCDIR EQUALS GENPL +20D
1202  REF  14 LAST  45      E5,1615  COUFLAG EQUALS GENPL +21D
1203  REF  15 LAST  45      E5,1616  GYTOBETO EQUALS GENPI +22D
1204  REF  16 LAST  45      E5,1617  OPTNREG EQUALS GENPI +23D
1205  REF  17 LAST  45      E5,1620  SAVE    EQUALS GENPI +24D   THREE CONSEC LOC
1206  REF  18 LAST  45      E5,1623  SPCONST1 EQUALS GENPI +27D
1207  REF  19 LAST  45      E5,1624  TIMER   EQUALS GENPL +28D

1208  REF  20 LAST  45      E5,1626  DATAPL  EQUALS GENPL +30D
1209  REF  21 LAST  45      E5,1570  RDSP    EQUALS GENPL       FIX LATER  POSSIBLY KEEP1
1210  REF  22 LAST  45      E5,1670  MASKREG EQUALS GENPL +64D
1211  REF  23 LAST  45      E5,1672  COUNDX  EQUALS GENPI +66D
1212  REF  24 LAST  45      E5,1673  RESULTCT EQUALS GENPI +67D
1213  REF  25 LAST  45      E5,1676  COUNTPL EQUALS GENPI +70D

1214  REF  26 LAST  45      E5,1677  COUANG  EQUALS GENPL +71D
1215  REF  27 LAST  45      E5,1570  AINLA   =      GENPI       110 DEC OR 156 OCT LOCATIONS
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```
1216  REF   1                    E5,1570  WANGO    EQUALS AINLA          VERT ERATE
1217  REF   2 LAST  46           E5,1572  WANGI    EQUALS AINLA +2D      HORIZONTAL ERATE
1218  REF   3 LAST  46           E5,1574  WANGT    EQUALS AINLA +4D      T
1219  REF   1                    E5,1574  TORQNDX  =      WANGT
1220  REF   4 LAST  46           E5,1576  DRIFTT   EQUALS AINLA +6D
1221  REF   5 LAST  46           E5,1600  ALX1S    EQUALS AINLA +8D
1222  REF   6 LAST  46           E5,1601  CMPX1    EQUALS AINLA +9D      IND
1223  REF   7 LAST  46           E5,1602  ALK      EQUALS AINLA +10D     GAINS
1224  REF   8 LAST  46           E5,1616  VLAUNS   EQUALS AINLA +22D
1225  REF   1                    E5,1616  THETAX   =      VLAJNS
1226  REF   9 LAST  46           E5,1620  WPLATO   EQUALS AINLA +24D
1227  REF  10 LAST  46           E5,1624  INTY     EQUALS AINLA +28D     SOUTH PIP INTE
1228  REF  11 LAST  46           E5,1626  ANGZ     EQUALS AINLA +30D     EAST AXIS
1229  REF  12 LAST  46           E5,1630  INTZ     EQUALS AINLA +32D     EAST PIP I
1230  REF  13 LAST  46           E5,1632  ANGY     EQUALS AINLA +34D     SOUTH
1231  REF   1                    E5,1624  THETAN   =      INTY
1232  REF  14 LAST  46           E5,1634  ANGX     EQUALS AINLA +36D     VE
1233  REF  15 LAST  46           E5,1636  DRIFTO   EQUALS AINLA +38D     VERT
1234  REF  16 LAST  46           E5,1640  DRIFTI   EQUALS AINLA +40D     SOU
1235  REF  17 LAST  46           E5,1644  VLAUN    EQUALS AINLA +44D
1236  REF   1                    E5,1644  FILDELV  =      VLAJN
1237  REF  18 LAST  46           E5,1646  ACCWD    EQUALS AINLA +46D
1238  REF   1                    E5,1646  INTVEC   =      ACCWD
1239  REF  19 LAST  46           E5,1654  POSNV    EQUALS AINLA +52D
1240  REF  20 LAST  46           E5,1656  DPIPAY   EQUALS AINLA +54D     SOUTH
1241  REF  21 LAST  46           E5,1662  DPIPAZ   EQUALS AINLA +58D     NORTH PIP INCREMENT
1242  REF  22 LAST  46           E5,1664  ALTIM    EQUALS AINLA +60D
1243  REF  23 LAST  46           E5,1665  ALTIMS   EQUALS AINLA +61D      INDEX
1244  REF  24 LAST  46           E5,1666  ALDK     EQUALS AINLA +62D      TIME CONSTAN
1245  REF  25 LAST  46           E5,1704  DELM     EQUALS AINLA +76D
1246  REF  26 LAST  46           E5,1714  WPLATI   EQUALS AINLA +84D
1247  REF  27 LAST  46           E5,1716  GEOSAVED EQUALS AINLA +86D
1248  REF  28 LAST  46           E5,1717  PREMTRXC EQUALS AINLA +87D
1249  REF  29 LAST  46           E5,1720  PRELMTRX EQUALS AINLA +88D
1250  REF   1                    E5,1720  TRANSM1  =      PRELMTRX
1251  REF  30 LAST  46           F5,1742  GEOCOMPS EQUALS AINLA +106D
1252  REF  31 LAST  46           E5,1743  OLDGT    EQUALS AINLA +107D
1253  REF  32 LAST  46           E5,1744  1SECXT   EQUALS AINLA +108D
1254  REF  33 LAST  46           E5,1745  GTSWTLST EQUALS AINLA +109D
1255  REF  34 LAST  46           E5,1746  ERECTIME EQUALS AINLA +110D
1256  REF  35 LAST  46           E5,1747  GEOMTRX  EQUALS AINLA +111D
1257  REF  36 LAST  46           E5,1771  ERCOMP   EQUALS AINLA +129D
1258  REF  37 LAST  46           E5,1777  ZERONDX  EQUALS AINLA +135D


1259  REF  28 LAST  45           E5,1570  BMEMORY  EQUALS GENPL
1260  REF   2 LAST  26              0405  DELVY    EQUALS DELVX +2
1261  REF   3 LAST  46              0407  DELVZ    EQUALS DELVX +4
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R1262           TUMBLE MONITOR

 1263  REF  1                    E6,1411  PCDUX    EQUALS E
 1264  REF  1                    E6,1412  PCDUY    EQUALS EDOT(2)
 1265  REF  1                    E6,1413  PCDUZ    EQUALS ER
 1266  REF  1                    E6,1416  DCDUY    EQUALS OMEGAQ
 1267  REF  1                    E6,1420  DCDUZ    EQUALS OMEGAR
 1268  REF  1                    E6,1422  OMEGA    EQUALS EDOTP
 1269                            E7,1400           SETLOC 3400

R1270           DOWNLINK STORAGE.

 1271                  E7,1400   E7,1400  LDATALST ERASE
 1272                  E7,1401   E7,1401  DNTMGOTO ERASE
 1273                  E7,1402   E7,1402  TMINDEX  ERASE
 1274                  E7,1403   E7,1403  DNCDUCNT ERASE
 1275                  E7,1404   E7,1404  DNCDUN   ERASE                 DNCDUN +1 CDU SAMPLES ARE DOWNLINKED.
 1276                  E7,1405   E7,1405  CDULMIT  ERASE
 1277                  E7,1406   E7,1406  DNQ      ERASE                 RETURN ADDRESS OF DOWNLINK SUBROUTINES
 1278                  E7,1407   E7,1434  DNTMBUFF ERASE  +21D           SNAPSHOT BUFFER.

R1279  ***********************************************************
R1280           ERASABLE INJECTION PARAMETERS FOR MISSION PHASE 4. PRELOADED.

 1281                  E7,1435   E7,1436  RINJECT  ERASE  +1             INJECTION RADIUS DESIRED.  THIS QUANTITY
A1282                                     DETERMINES THE PERIGEE.  MUST BE IN METERS * 2(-25)

 1283                  E7,1437   E7,1440  VINJECT  ERASE  +1             INJECTION VELOCITY DESIRED.  THIS QUANTI
A1284                                     TY DETERMINES APOGEE.  MUST BE IN METERS/CENTISECONDS * 2(-7)

R1285  ***********************************************************

R1286           RADAR TEST STORAGE.

 1287                  E7,1441   E7,1441  RTSTDEX  ERASE
 1288                  E7,1442   E7,1442  RTSTMAX  ERASE                 66 FOR HI SPEED, 6 FOR LOW SPEED RR,
A1289                                                                    AND 18 FOR LOW SPEED LR.
 1290                  E7,1443   E7,1443  RTSTBASE ERASE                 USED FOR CYCLIC SAMPLING.
 1291                  E7,1444   E7,1444  RTSTLOC  ERASE                 GOES 0(6)RTSTMAX
 1292  REF  1                    E7,1444  RSTKLOC  EQUALS RTSTLOC
 1293                  E7,1445   E7,1445  RSAMPDT  ERASE                 PNZ FOR CYCLIC SAMPLING, -1 FOR HI SPEED
A1294                                                                    INSERT +0 HERE MANUALLY TO TERMINATE TST
 1295                  E7,1446   E7,1446  RFAILCNT ERASE
 1296                  E7,1447   E7,1556  RSTACK   ERASE  +71D          BUFFERS FOR RADAR TESTING.

R1299           STORAGE FOR INBIT SCANNER.

 1300                  E7,1557   E7,1561  LAST30   ERASE  +2             LAST SAMPLED INBITS.
 1301                  E7,1562   E7,1562  MSGCNT   ERASE
```

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R1302 THE COMPTORK REGISTERS ARE REDUNDANT WITH THETAN FOR DOWNLINK PURPOSES.

1303		E7,1563	E7,1570	COMPTORK	ERASE	+5	V, S, E GYROCOMPASS GYRO TORQUES.
13033		E7,1571	E7,1572	VTO-DPS	ERASE	+1	FOR MP 4
13035		E7,1573	E7,1574	VTAILOFF	ERASE	+1	FOR MP 9
13037		E7,1575	E7,1576	VTO-APS	ERASE	+1	FOR MP 13
1304		E7,1577	E7,1600	TGONOM	ERASE	+1	FOR MP 13
1305		E7,1601	E7,1602	COS27	ERASE	+1	FOR MP 13
1306		E7,1603	E7,1604	SIN27	ERASE	+1	FOR MP 13
1307		E7,1605	E7,1612	VCONOM	ERASE	+5	FOR MP 13
1308		E7,1613	E7,1620	RCOTEMPV	ERASE	+5	FOR MP 13
13085		E7,1621	E7,1622	TAGS	ERASE	+1	FOR MP 13
1309		E7,1623	E7,1625	ABDVCONV	ERASE	+2	FOR MP 11
13095		E7,1626	E7,1627	KT	ERASE	+1	FOR MP 4 & 13.

R1310 BMEMORY USED FOR CONSECUTIVE ASSIGNMENTS FOR SERVICER RESTART

1311		E5,1506	SAVERASE	EQUALS	2506	
1312	REF 3 LAST 42	E5,1506	DVTOTAL	EQUALS	SAVERASE	+000D
1313	REF 4 LAST 48	E5,1511	DVCNTR	EQUALS	SAVERASE	+003D
1314	REF 5 LAST 48	E5,1512	PIPCTR	EQUALS	SAVERASE	+004D
1315	REF 6 LAST 48	E5,1513	VR	EQUALS	SAVERASE	+005D
1316	REF 7 LAST 48	E5,1522	VGCNTR	EQUALS	SAVERASE	+012D
1317	REF 8 LAST 48	E5,1523	ERRORSUM	EQUALS	SAVERASE	+013D
1318	REF 9 LAST 48	E5,1531	DIFFANG	EQUALS	SAVERASE	+019D
1319	REF 10 LAST 48	E5,1533	STREXIT	EQUALS	SAVERASE	+021D
1320	REF 11 LAST 48	E5,1534	ABDELV	EQUALS	SAVERASE	+022D
1321	REF 12 LAST 48	E5,1536	SWITCH	EQUALS	SAVERASE	+24D
1322	REF 13 LAST 48	E5,1537	NEGXDV	EQUALS	SAVERASE	+25D

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P1323           EBANK=6 ASSIGNMENTS.

R1324           (DIGITAL AUTOPILOT USES ALL OF EBANK=6)

 1325                                   E6,1400          SETLOC 3000

R1326  AXIS TRANSFORMATION MATRIX - PILOT TO GIMBAL AXES:

 1327                          E6,1400  E6,1400  MR12     ERASE              SCALED AT 2   THESE FOUR P-G MATRIX ELE-
 1328                          E6,1401  E6,1401  MR22     ERASE              SCALED AT 1   MENTS ARE IN THIS ORDER TO
 1329                          E6,1402  E6,1402  MR13     ERASE              SCALED AT 2   COMPUTE RATE HOLD DELCDUS
 1330                          E6,1403  E6,1403  MR23     ERASE              SCALED AT 1   WITH AN INDEXED LOOP

R1331  AXIS TRANSFORMATION MATRIX - GIMBAL TO PILOT AXES:

 1332                          E6,1404  E6,1404  M11      ERASE              SCALED AT 1
 1333                          E6,1405  E6,1405  M21      ERASE              SCALED AT 1
 1334                          E6,1406  E6,1406  M31      ERASE
 1335  REF  1                           E6,1401  M22      EQUALS MR22        SCALED AT 1
 1336  REF  1                           E6,1403  M32      EQUALS MR23        SCALED AT 1

R1337  ANGLE MEASUREMENTS.

 1338                          E6,1407  E6,1410  EDOT     ERASE  +1          ERROR IN ANGULAR RATE:
 1339  REF  1                           E6,1410  EDOT(R)  EQUALS EDOT +1     SCALED DOWN TO PI/16 RADIANS/SECOND

 1340                          E6,1411  E6,1412  E        ERASE  +1          ANGLE ERROR SCALED AT PI RADIANS
 1341  REF  2 LAST  47                  E6,1412  EDOT(2)  EQUALS E +1        ERROR RATE SQUARED SCALED AT PI(2)/16
 1342  REF  3 LAST  49                  E6,1411  EQ       EQUALS E           THIS PAIR OF NAMES IS USED TO REFER TO
 1343  REF  2 LAST  47                  E6,1412  EDOT(2)Q EQUALS EDOT(2)     THE ABOVE ERASABLES AS Q-AXIS DATA
 1344                          E6,1413  E6,1414  ER       ERASE  +1          THIS PAIR OF NAMES REFERS TO LOCATIONS
 1345  REF  2 LAST  47                  E6,1414  EDOT(2)R EQUALS ER +1       FOR THE R-AXIS DATA; INTERCHANGES WITH Q

 1346                          E6,1415  E6,1421  OMEGAP   ERASE  +4          BODY-AXIS ROT. RATES SCALED AT PI/4 AND
 1347  REF  1                           E6,1416  OMEGAQ   EQUALS OMEGAP +1   BODY-AXIS ACCELERATIONS SCALED AT PI/8
 1348  REF  2 LAST  49                  E6,1417  ALPHAQ   EQUALS OMEGAP +2   (IN DESCENT) OR PI/2 (IN ASCENT)
 1349  REF  3 LAST  49                  E6,1420  OMEGAR   EQUALS OMEGAP +3   THESE W,A PAIRS ARE NEEDED, ALPHAP HAS
 1350  REF  4 LAST  49                  E6,1421  ALPHAR   EQUALS OMEGAP +4   NO USE IN THE DIGITAL AUTOPILOT

 1351                          E6,1422  E6,1424  EDOTP    ERASE  +2          ERRORS IN ANGULAR RATE:
 1352  REF  2 LAST  47                  E6,1423  EDOTQ    EQUALS EDOTP +1    EDOT = OMEGA - OMEGA(DESIRED)
 1353  REF  3 LAST  49                  E6,1424  EDOTR    EQUALS EDOTP +2    SCALED AT PI/4 RADIANS/SECOND

 1354  REF  1                           E6,1423  RRATEDIF EQUALS EDOTQ       ALTERNATIVE NAMES:
 1355  REF  1                           E6,1424  RRATEDIF EQUALS EDOTR       DELETE WHEN NO. OF REFERENCES = 0

 1356                          E6,1425  E6,1430  OLDXFORP ERASE  +3          STORED CDU READINGS FOR P AND Q,R RATE
 1357  REF  1                           E6,1426  OLDYFORP EQUALS OLDXFORP +1 DERIVATIONS; SCALED AT PI RADIANS (2'S)
 1358  REF  2 LAST  49                  E6,1427  OLDYFORQ EQUALS OLDXFORP +2 (THERE MUST BE TWO REGISTERS FOR CDUY
 1359  REF  3 LAST  49                  E6,1430  OLDZFORQ EQUALS OLDXFORP +3 SINCE P AND Q,R ARE NOT IN PHASE)
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L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 39

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R1360   RHC INPUTS SCALED AT PI/4 RAD/SEC.

 1361                       E6,1431   E6,1431  PCOM     ERASE
 1362                       E6,1432   E6,1432  RCOM     ERASE
 1363                       E6,1433   E6,1433  YCOM     ERASE

R1364   RHC COUNTER REGISTERS.

 1365                            0043  P-RHCCTR EQUALS 43
 1366                            0042  Q-RHCCTR EQUALS 42
 1367                            0044  R-RHCCTR EQUALS 44

R1368   OTHER VARIABLES.

 1369                       E6,1434   E6,1434  TJETSIGN ERASE          =+/-BIT1 TO SHOW SIGN OF P-AXIS ROTATION
 1370                       E6,1435   E6,1435  PRATECOM ERASE
 1371                       E6,1436   E6,1436  EDOTGEN  ERASE
 1372                       E6,1437   E6,1437  RATEDIF  ERASE
 1373                       E6,1440   E6,1440  1/2JTSP  ERASE
 1374                       E6,1441   E6,1441  FPQR     ERASE
 1375                       E6,1442   E6,1442  MINRA    ERASE
 1376                       E6,1443   E6,1443  MINRASQ  ERASE
 1377                       E6,1444   E6,1444  HDAP     ERASE
 1378   REF   1                       E6,1444  FCT1     EQUALS HDAP
 1379                       E6,1445   E6,1445  J        ERASE
 1380                       E6,1446   E6,1446  DENOM    ERASE
 1381                       E6,1447   E6,1447  RATIO    ERASE
 1382                       E6,1450   E6,1450  L,PVT-CG ERASE
 1383                       E6,1451   E6,1451  TEMPINER ERASE
 1384                       E6,1452   E6,1452  IXX      ERASE
 1385                       E6,1453   E6,1453  IYY      ERASE
 1386                       E6,1454   E6,1454  IZZ      ERASE
 1387                       E6,1455   E6,1455  4JETTORK ERASE
 1388                       E6,1456   E6,1456  JETTORK4 ERASE
 1389                       E6,1457   E6,1457  COSMG    ERASE
 1390   REF   3 LAST  14                0062  DELTAP   EQUALS ITEM02
 1391                       E6,1460   E6,1460  FPQRMIN  ERASE
 1392                       E6,1461   E6,1461  NJET     ERASE
 1393                       E6,1462   E6,1462  PRATEDIF ERASE
 1394                       E6,1463   E6,1463  LASTPER  ERASE          THESE 6 REG USED FOR ATT ERR DISPLAY
 1395                       E6,1464   E6,1464  LASTQER  ERASE
 1396                       E6,1465   E6,1465  LASTRER  ERASE
 1397                       E6,1466   E6,1466  PERROR   ERASE
 1398                       E6,1467   E6,1467  QERROR   ERASE
 1399                       E6,1470   E6,1470  RERROR   ERASE

R1400   JET STATE CHANGE VARIABLES- TIME (TOFJTCHG),JET BITS WRITTEN NOW
R1401     (JTSONNOW), AND JET BITS WRITTEN AT T6 RUPT (JTSATCHG).

 1402                       E6,1471   E6,1471  JTSONNOW ERASE
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L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 40

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1403                        E6,1472  E6,1472  JTSATCHG ERASE
1404                        E6,1473  E6,1473  ADDT6JTS ERASE
1405                        E6,1474  E6,1474  ADDTLT6  ERASE
1406                        E6,1475  E6,1475  TDFJTCHG ERASE

1407                        E6,1476  E6,1477  JRGLMS   ERASE   +1      THESE TWO ADJACENT REGISTERS HOLD THE
1408  REF   1                        E6,1476  JRGLM1   EQUALS JRGLMS  ASCENT OR DESCENT 4-JET URGENCY LIMIT
1409  REF   2 LAST  51               E6,1477  JRGLM2   EQUALS JRGLMS +1  SCALED AT 2(+9) AND 2(+4) SECS. RESPECT.

1410                        E6,1500  E6,1501  -2JETLIM ERASE   +1      RATE COMMAND 4-JET RATE DIFFERENCE LIMIT
1411  REF   1                        E6,1501  -RATED3  EQUALS -2JETLIM +1  AND RATE DEADBAND FOR ASCENT OR DESCENT

R1412 Q,R AXIS ERASABLES

1413  REF   4 LAST  50                 0062   DELQ     EQUALS ITEMP2
1414                        E6,1502  E6,1503  JRGENCYQ ERASE   +1
1415                        E6,1504  E6,1505  JRGENCYR ERASE   +1
1416  REF   1                          0066   JRGLIMIT =       ITEMP6
1417                        E6,1506  E6,1506  A+B      ERASE
1418                        E6,1507  E6,1507  A-B      ERASE
1419                        E6,1510  E6,1510  TERMA    ERASE
1420                        E6,1511  E6,1512  TERMB    ERASE   +1
1421                        E6,1513  E6,1514  INVACCSQ ERASE   +1
1422                        E6,1515  E6,1515  DISPLACT ERASE           FLAG FOR EIGHTBALL ATT. ERROR DISPLAY.

1423                        E6,1516  E6,1516  POLTEST  ERASE
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 41

P1424 TRIM GIMBAL CONTROL LAW ERASABLES:

R1425 THE FOLLOWING ASSIGNMENTS OF RUPTREGS AND ITEMPS HAS BEEN MADE IN AN EFFORT TO OPTIMIZE USE OF ERASABLES:

```
1427  REF  2 LAST 14          0070  K2THETA  EQUALS RUPTREG1   D.P. K(2)THETA AND "NEGUSUM"
1428  REF  1                  0071  ETHETA   EQUALS RUPTREG2   S.P. ERROR ANGLE SCALED AT PI/64 RADIANS
1429  REF  1                  0072  A2CNTRAL EQUALS RUPTREG3   D.P. ALPHA(2) SCALED AT PI(2)/64 R/S(2)
1430  REF  2 LAST 52          0072  SF1      EQUALS RUPTREG3   S.P. VARIABLE SCALE FACTORS WHICH ARE
1431  REF  3 LAST 14          0073  SF2      EQUALS RUPTREG4   S.P. - REALLY SINGLE BITS (OR ZERO)
1432  REF  3 LAST 14          0061  OMEGA.K  EQUALS ITEMP1     D.P. OMEGA*K SUPERCEDES K AND K(2)
1433  REF  4 LAST 52          0061  KCENTRAL EQUALS ITEMP1     S.P. K FROM KQ OR KR FIRST AT PI/2(8)
1434  REF  5 LAST 51          0062  K2CNTRAL EQUALS ITEMP2     S.P. K(2) FROM Q OR R 1ST AT PI(2)/2(16)
1435  REF  3 LAST 14          0063  WCENTRAL EQUALS ITEMP3     S.P. OMEGA SCALED AT PI/4 RADIANS/SECOND
1436  REF  3 LAST 14          0064  ACENTRAL EQUALS ITEMP4     S.P. ALPHA SCALED AT PI/8 RAD/SEC(2)
1437  REF  2 LAST 14          0065  DEL      EQUALS ITEMP5     S.P. SGN(FUNCTION)
1438  REF  2 LAST 51          0066  QRCNTR   EQUALS ITEMP6     S.P. COUNTER: Q,Y=0, R,Z=2
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R1439 THE ABOVE QUANTITIES ARE ONLY NEEDED ON A VERY TEMPORARY BASIS AND HAVE BEEN PROVEN TO BE NON-CONFLICTING.

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1441                      E6,1517  E6,1517  TJSR     ERASE
1442                      E6,1520  E6,1520  MULTFLAG ERASE             INDICATOR FOR SPDPMULT ROUTINE

1443                      E6,1521  E6,1522  FUNCTION ERASE  +1         D.P. WORD FOR DRIVE FUNCTIONS

1444                      E6,1523  E6,1525  NEGUQ    ERASE  +2         NEGATIVE OF Q-AXIS GIMBAL DRIVE
1445  REF  1                       E6,1525  NEGUR    EQUALS NEGUQ +2   NEGATIVE OF R-AXIS GIMBAL DRIVE

1446                      E6,1526  E6,1531  KQ       ERASE  +3         .3ACCDOTQ SCALED AT PI/2(8)
1447  REF  1                       E6,1527  KQ2      EQUALS KQ +1      KQ2 = KQ*KQ
1448  REF  2 LAST 52               E6,1530  KRDAP    EQUALS KQ +2      .3 ACCDOTR SCALED AT PI/2(8)
1449  REF  3 LAST 52               E6,1531  KR2      EQUALS KQ +3      KR2 = KR*KR

1450                      E6,1532  E6,1535  ACCDOTQ  ERASE  +3         Q-JERK SCALED AT PI/2(7) UNSIGNED
1451  REF  1                       E6,1533  QACCDOT  EQUALS ACCDOTQ +1 Q-JERK SCALED AT PI/2(7) SIGNED
1452  REF  2 LAST 52               E6,1534  ACCDOTR  EQUALS ACCDOTQ +2 R-JERK SCALED AT PI/2(7) UNSIGNED
1453  REF  3 LAST 52               E6,1535  RACCDOT  EQUALS ACCDOTQ +3 R-JERK SCALED AT PI/2(7) SIGNED

1454  REF  1                       E6,1467  QDIFF    EQUALS QERROR     ATTITUDE ERRORS:
1455  REF  1                       E6,1470  RDIFF    EQUALS RERROR     SCALED AT PI RADIANS

1456                      E6,1536  E6,1536  TIMEOFFQ ERASE             TIMES TO GO UNTIL TRIM GIMBAL TURN-OFF,
1457                      E6,1537  E6,1537  TIMEOFFR ERASE             ZERO MEANS NO ACTION, SCALED AS WAITLIST
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 42

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P1458   KALMAN FILTER ERASABLES.

 1459                        E6,1540  E6,1540  STORCDJY ERASE                THIS S.P. PAIR IS USED TO SAVE CDJY,Z
 1460                        E6,1541  E6,1541  STORCDJZ ERASE                FOR THE GTS RUPT

 1461   REF  3 LAST  52              0072     CDU      EQUALS RUPTREG3       RUPTREG3,4 USED AS D.P. WORD FOR CDU
A1462                                                                        VALUE WITHIN FILTER IS COMP AT 2PI RAD

 1463   REF  5 LAST  52              0061     CDUDOT   EQUALS ITEMP1         ITEMP1,2 USED AS D.P. WORD FOR CDJDOT
A1464                                                                        VALUE WITHIN FILTER SCALED AT PI/4

 1465   REF  4 LAST  52              0063     CDU2DOT  EQUALS ITEMP3         ITEMP3,4 USED AS D.P. WORD FOR CDJ2DOT
A1466                                                                        VALUE WITHIN FILTER SCALED AT PI/8

 1467                        E6,1542  E6,1542  DT       ERASE                TIME ELAPSED SCALED AT 1/8: NOMINAL=50MS
 1468                        E6,1543  E6,1543  DAPTIME  ERASE                USED TO RECORD LAST TIME FROM CHANNEL 4

 1469                        E6,1544  E6,1544  STEERADR ERASE                DTCALC SWITCH IN FILTER INITIALIZATION

 1470                        E6,1545  E6,1546  DPDIFF   ERASE   +1           D.P. WEIGHTING VECTOR FACTOR AT PI
 1471                        E6,1547  E6,1547  WPOINTER ERASE                POINTER TO WEIGHTING VECTOR TABLE
 1472                        E6,1550  E6,1552  W0       ERASE   +2           THETA WEIGHT
 1473   REF  1                       E6,1551  W1       EQUALS W0 +1         OMEGA WEIGHT
 1474   REF  1                       E6,1552  W2       EQUALS W1 +1         ALPHA WEIGHT

 1475                        E6,1553  E6,1554  CDUYFIL  ERASE   +1           Y-AXIS D.P. FILTERED THETA AT 2PI
 1476                        E6,1555  E6,1556  CDUZFIL  ERASE   +1           Z-AXIS D.P. FILTERED THETA AT 2PI
 1477                        E6,1557  E6,1560  DCDUYFIL ERASE   +1           Y-AXIS D.P. FILTERED OMEGA AT PI/4
 1478                        E6,1561  E6,1562  DCDUZFIL ERASE   +1           Z-AXIS D.P. FILTERED OMEGA AT PI/4
 1479                        E6,1563  E6,1564  D2CDUYFL ERASE   +1           Y-AXIS D.P. FILTERED ALPHA AT PI/8
 1480                        E6,1565  E6,1566  D2CDUZFL ERASE   +1           Z-AXIS D.P. FILTERED ALPHA AT PI/8
 1481                        E6,1567  E6,1567  Y3DOT    ERASE                Y-AXIS S.P. JERK AT PI/2(7)
 1482                        E6,1570  E6,1570  CDU3DOT  ERASE                        LOOP REGISTER (SPACER)
 1483                        E6,1571  E6,1571  Z3DOT    ERASE                Z-AXIS S.P. JERK AT PI/2(7)

 1484                        E6,1572  E6,1573  PFILTADR ERASE   +1           2CADR FOR FILTER RUPT 30 MS AFTER P-AXIS
 1485                        E6,1574  E6,1603  PFRPTLST ERASE   +7           POST FILTER RUPT LIST
R1486   TORQUE VECTOR RECONSTRUCTION VARIABLES:

 1487                        E6,1604  E6,1606  JETRATE  ERASE   +2           WEIGHTED RATES DUE TO JETS APPLIED IN
 1488   REF  1                       E6,1605  JETRATEQ EQUALS JETRATE +1     THE LAST CONTROL SAMPLE PERIOD OF 100 MS
 1489   REF  2 LAST  53              E6,1606  JETRATER EQUALS JETRATE +2     SCALED AT PI/4 RADIANS/SECOND

 1490                        E6,1607  E6,1610  NO.QJETS ERASE   +1           NUMBER OF Q AND R JETS THAT ARE GIVEN
 1491   REF  1                       E6,1610  NO.RJETS EQUALS NO.QJETS +1    BY THE JET SELECT LOGIC

 1492                        E6,1611  E6,1612  TP       ERASE   +1           TIME CALCULATED BY TJETLAW FOR P, QR
 1493   REF  1                       E6,1612  TQR      EQUALS TP +1         SCALED AS TIME6, THEN TQR RESCALED TO 1

 1494                        E6,1613  E6,1617  1JACC    ERASE   +4           ACCELERATIONS DUE TO 1 JET TORQUING
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 43

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1495   REF  1                    E6,1614  1JACCQ   EQUALS 1JACC +1      SCALED AT PI/4 RADIANS/SECOND
1496   REF  2 LAST  54           E6,1615  1JACCR   EQUALS 1JACC +2
1497   REF  3 LAST  54           E6,1616  1JACCU   EQUALS 1JACC +3      FOR U,V-AXES THE SCALE FACTOR IS  DIFF:
1498   REF  4 LAST  54           E6,1617  1JACCV   EQUALS 1JACC +4      SCALED AT PI/2 RADIANS/SECOND (FOR ASC)

1499                  E6,1620    E6,1620  INERCTR  ERASE
1500                  E6,1621    E6,1621  INERCTRX ERASE
R1501  ASCENT VARIABLES;

1502                  E6,1622    E6,1623  SAVRATEQ ERASE   +1           UN-WEIGHTED JETRATE FOR LAST CSD BEFORE
1503   REF  1                    E6,1623  SAVRATER EQUALS SAVRATEQ +1    AOSTASK.  INITIAL VALUES FOR SUMRATES.

1504                  E6,1624    E6,1625  SUMRATEQ ERASE   +1           SUM OF UN-WEIGHTED JETRATE TERMS
1505   REF  1                    E6,1625  SUMRATER EQUALS SUMRATEQ +1    SCALED AT PI/4 RADIANS/SECOND

1506                  E6,1626    E6,1627  OLDWFORQ ERASE   +1           OMEGA VALUE 2 SECONDS AGO
1507   REF  1                    E6,1627  OLDWFORR EQUALS OLDWFORQ +1    SCALED AT PI/4 RADIANS/SECOND

1508                  E6,1630    E6,1631  DBMINIMP ERASE   +1           MINIMUM IMPULSE DEADBANDS (EQUA. IN DESC
1509   REF  1                    E6,1631  MINIMPDB EQUALS DBMINIMP +1    AT .3 DEG, 0.-DB RESPECTIVELY FOR ASC)
1510                  E6,1632    E6,1632  DBMNMPAX ERASE                 P-AXIS VALUE; SCALED AT PI RADIANS.

1511                  E6,1633    E6,1637  .5ACCMNE ERASE   +4           (1/2)(1/ACCMIN) WHICH IS THE INVERSE OF
1512   REF  1                    E6,1634  .5ACCMNQ EQUALS .5ACCMNE +1    THE MINIMUM ACCELERATION (A CONSTANT FOR
1513   REF  2 LAST  54           E6,1635  .5ACCMNR EQUALS .5ACCMNE +2    DESCENT AND A VARIABLE FOR ASCENT DAP)
1514   REF  3 LAST  54           E6,1636  .5ACCMNU EQUALS .5ACCMNE +3    SCALED AT 2(+8)/PI
1515   REF  4 LAST  54           E6,1637  .5ACCMNV EQUALS .5ACCMNE +4    IN UNITS OF SECONDS(2)/RADIAN

1516                  E6,1640    E6,1641  WFORP    ERASE   +1           W = K/(NOMINAL DT)
1517   REF  1                    E6,1641  WFORQR   EQUALS WFORP +1       SCALED AT 16

1518                  E6,1642    E6,1643  (1-K)    ERASE  +1            1-K SCALED AT 1
1519   REF  1                    E6,1643  (1-K)/8  EQUALS (1-K) +1       1-K SCALED AT 8

1520                  E6,1644    E6,1647  1/NJTSQ  ERASE   +3           1/NJETACC FOR EACH AXIS
1521   REF  1                    E6,1645  1/NJTSR  EQUALS 1/NJTSQ +1     FOR DESCENT THIS IS ALWAYS 1/2JTS
1522   REF  2 LAST  54           E6,1646  1/NJTSJ  EQUALS 1/NJTSQ +2     FOR ASCENT WITH HIGH OFFSET: 1/4JTS
1523   REF  3 LAST  54           E6,1647  1/NJTSV  EQUALS 1/NJTSQ +3     SCALED AT 2(8)/PI SEC(2)/RAD

1524                  E6,1650    E6,1650  COUEFCTR ERASE                 COUNTER FOR ASCENT DAP


1525                  E6,1651    E6,1651  DLCDUIDX ERASE                 SAVE RATE INDEX, = 1, 0
1526                  E6,1652    E6,1653  PJUMPADR ERASE   +1
1527   REF  1                    E6,1653  QJUMPADR EQUALS PJUMPADR +1     IN THE LM DAP ISRUPTS TO SKIP P-AXIS
1528                  E6,1654    E6,1654  CHSTEMP  ERASE
1529                  E6,1655    E6,1655  -.06R/S2 ERASE                 DESCENT VAL.=0, ASCENT VAL.= -.06 RAD/S

1530                  E6,1656    E6,1656  1DOMSPTQ ERASE
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L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 44

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1531  REF  1                        E6,1656  QR.1SIDQ =      100MCPTQ
1532                          E6,1657  E6,1657  ND.PJETS ERASE


R1533  THE FOLLOWING LM DAP ERASABLES ARE ZEROED IN THE STARTDAP SECTION OF THE DAPIDLER PROGRAM AND THE COASTASC
R1535  SECTION OF THE AOSTASK.  THE ORDER MUST BE PRESERVED FOR THE INDEXING METHODS WHICH ARE EMPLOYED IN THOSE
R1537  SECTIONS AND ELSEWHERE.

1538                          E6,1660  E6,1663  AOSQ     ERASE   +3          ASCENT OFFSET ACCELERATION ESTIMATES:
1539  REF  1                           E6,1661  AOSR     EQUALS  AOSQ +1     ESTIMATED EVERY 2 SECONDS BY AOSTASK.
1540  REF  2 LAST  55                  E6,1662  AOSU     EQUALS  AOSQ +2     U,V-AXES ACCS FORMED BY VECTOR ADDITION.
1541  REF  3 LAST  55                  E6,1663  AOSV      EQUALS  AOSQ +3     SCALED AT PI/2 RADIANS/SECOND(2).

1542                          E6,1664  E6,1665  AOSQTERM ERASE   +1          (.1-.05K)AOS
1543  REF  1                           E6,1665  AOSRTERM EQUALS  AOSQTERM +1  SCALED AT PI/4 RADIANS/SECOND.

1544                          E6,1666  E6,1675  NJ+Q     ERASE   +7          2 JET OVER-RIDE FLAGS:
1545  REF  1                           E6,1667  NJ-Q     EQUALS  NJ+Q +1     WHENEVER THE OFFSET ACCELERATION ABOUT
1546  REF  2 LAST  55                  E6,1670  NJ+R     EQUALS  NJ+Q +2     AN AXIS IS SO HIGH THAT 2 JETS COULD NOT
1547  REF  3 LAST  55                  E6,1671  NJ-R     EQUALS  NJ+Q +3     CONTROL ATTITUDE SUCCESSFULLY, THEN NJ
1548  REF  4 LAST  55                  E6,1672  NJ+U     EQUALS  NJ+Q +4     FOR THAT AXIS (IN THE DIRECTION OPPOSING
1549  REF  5 LAST  55                  E6,1673  NJ-U     EQUALS  NJ+Q +5     AOS) IS SET TO 1.  OTHERWISE, THE VALUE
1550  REF  6 LAST  55                  E6,1674  NJ+V     EQUALS  NJ+Q +6     IS ZERO.  THESE FLAGS PREVENT TWO JETS
1551  REF  7 LAST  55                  E6,1675  NJ-V     EQUALS  NJ+Q +7     FROM BEING REQUESTED TO FIGHT THE AOS.

1552                          E6,1676  E6,1715  1/NET+2Q ERASE   +15D
1553  REF  1                           E6,1677  1/NET+4Q EQUALS  1/NET+2Q +1
1554  REF  2 LAST  55                  E6,1700  1/NET-2Q EQUALS  1/NET+2Q +2
1555  REF  3 LAST  55                  E6,1701  1/NET-4Q EQUALS  1/NET+2Q +3
1556  REF  4 LAST  55                  E6,1702  1/NET+2R EQUALS  1/NET+2Q +4
1557  REF  5 LAST  55                  E6,1703  1/NET+4R EQUALS  1/NET+2Q +5
1558  REF  6 LAST  55                  E6,1704  1/NET-2R EQUALS  1/NET+2Q +6
1559  REF  7 LAST  55                  E6,1705  1/NET-4R EQUALS  1/NET+2Q +7
1560  REF  8 LAST  55                  E6,1706  1/NET+1U EQUALS  1/NET+2Q +8D
1561  REF  9 LAST  55                  E6,1707  1/NET+2U EQUALS  1/NET+2Q +9D
1562  REF 10 LAST  55                  E6,1710  1/NET-1U EQUALS  1/NET+2Q +10D
1563  REF 11 LAST  55                  E6,1711  1/NET-2U EQUALS  1/NET+2Q +11D
1564  REF 12 LAST  55                  E6,1712  1/NET+1V EQUALS  1/NET+2Q +12D
1565  REF 13 LAST  55                  E6,1713  1/NET+2V EQUALS  1/NET+2Q +13D
1566  REF 14 LAST  55                  E6,1714  1/NET-1V EQUALS  1/NET+2Q +14D
1567  REF 15 LAST  55                  E6,1715  1/NET-2V EQUALS  1/NET+2Q +15D
1568                          E6,1716  E6,1716  SIGNTAG  ERASE
1569  REF  1                           E6,1706  1/NETACS EQUALS  1/NET+1U

1570                          E6,1717  E6,1720  1/ACCQ   ERASE   +1          INVERSE NET ACCELERATIONS FOR URGENCY.
1571  REF  1                           E6,1720  1/ACCR   EQUALS  1/ACCQ +1   SCALED AT 2(+8)/PI SECONDS(2)/RADIAN.

1572                          E6,1721  E6,1722  1/AMINQ  ERASE   +1          INVERSE MIN ACCELERATIONS FOR URGENCY.
1573  REF  1                           E6,1722  1/AMINR  EQUALS  1/AMINQ +1  SCALED AT 2(+8)/PI SECONDS(2)/RADIAN.
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 45

```
 1574                       E6,1723   E6,1723   1/AMINJ   ERASE
 1575                       E6,1724   E6,1724   1/AMINV   ERASE

 1576                       E6,1725   E6,1726   JRGRATJ   ERASE  +1          URGENCY FUNCTION CORRECTION FACTOR RATIO
 1577  REF   1                      E6,1726   JRGRATR   EQUALS JRGRATQ +1    SCALED AT 1.
 1578                       E6,1727   E6,1727   SRTEMP    ERASE              SCRATCH CELLS FOR DAPSQRT
 1579                       E6,1730   E6,1730   SQRTTEMP  ERASE              SCRATCH CELLS FOR DAPSQRT
 1580                       E6,1731   E6,1731   SQRTTEMQ  ERASE              SCRATCH CELLS FOR DAPSQRT

 1581                       E6,1732   E6,1732   ADSCOUNT  ERASE
 1582  REF   1                      E6,1727   QJOTTEMP  EQUALS SRTEMP        SCRATCH CELL FOR Q,R-AXIS TJETLAW.

 1583                       E6,1733   E6,1735   QACDOTMP  ERASE  +2          Q(R)ACCDOT VALUES STORED HERE BETWEEN
 1584  REF   1                      E6,1735   RACDOTMP  EQUALS QACDOTMP +2  GTS,DGTS BEFORE THE FILTER CAN USE THEM

R1585  SPACING BETWEEN RACDOTMP AND QACDOTMP IS USED IN INDEXING.

 15851                      E6,1736   E6,1736   PASSCTR   ERASE              COUNT REQUIRED KALMAN FILTER PASSES LEFT
 15852                      E6,1737   E6,1737   SLECTLAW  ERASE              CONTROL FLOW SWITCHING CELL.
 15853                      E6,1740   E6,1741   HOLDCDUY  ERASE  +1          TWO CELLS HOLD CDUS DURING INITIAL RATE
 15854  REF   1                      E6,1741   HOLDCDUZ  EQUALS HOLDCDUY +1 CALCULATION IN KALMAN FILTER.
 15855                      E6,1742   E6,1742   STEERAD2  ERASE              CONTROL FLOW SWITCHING CELL.
 15856                      E6,1743   E6,1743   COUNTBOX  ERASE              LOAD FOR INITIALIZING PASSCTR.

R158565 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

 15857                      E6,1744   E6,1744   TRIMCNTR  ERASE              COUNTER TO ENSURE A GTS PASS SHORTLY
A158571                                                                       BEFORE THROTTLE-UP. (LOADED NEGATIVE)
 158572                     E6,1745   E6,1745   GTSMNITR  ERASE              FLAG TO FORCE A GTS PASS SOON AFTER DPS
A158573                                                                       ENGINE-ON. (LOADED +0)

R158574 PARAMETERS IN ERASABLE LOAD;

 158575                     E6,1746   E6,1746   FORCETRM  ERASE              PLACED IN TRIMCNTR WHEN DPS TURNED ON.
 158576                     E6,1747   E6,1747   DRIVELIM  ERASE              MAX GIMBAL DRIVE TIME SCALED AT 16 SEC.
 158577                     E6,1750   E6,1752   DRIVFACQ  ERASE  +2          RESCALING AND DAMPING FACTORS FOR GIMBAL
 15858  REF   1                      E6,1752   DRIVFACR  =      DRIVFACQ +2    DRIVE TIMES.
 158581                     E6,1753   E6,1754   QGIMTIMR  ERASE  +1          GIMBAL DRIVE TIMERS
 158582 REF   1                      E6,1754   RGIMTIMR  =      QGIMTIMR +1
 158583                     E6,1755   E6,1755   MAXTIME   ERASE
 158584                     E6,1756   E6,1756   /TEMP2/   ERASE
 158585                     E6,1757   E6,1760   /TEMP3/   ERASE  +1
 158586                     E6,1761   E6,1762   /TEMP5/   ERASE  +1
 158587                     E6,1763   E6,1763   TMINAPS   ERASE
 15859                      E6,1764   E6,1764   SIMPCNTR  ERASE              POSITIVE FOR GTS SIMPCTRL. DECISECONDS
 158595                     E6,1765   E6,1765   SIMPINIT  ERASE              INITIALIZES SIMPCNTR. DECISECONDS
 158598                     E6,1766   E6,1766   BIGBOX    ERASE              USED FOR PASSCTR DURING FORCED SIMPCNTRL

R1586  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 46

R15865 ITEMP AND RUPTREG ASSIGNMENTS IN LM DAP:

R1587 FOR EIGHTBAL SECTION:

```
1588  REF   6 LAST  53          0061  AXISCNTR EQUALS ITEMP1      LOOPCTR AND VARIABLE INDEXER.
1589  REF   6 LAST  52          0062  TEMPERR  EQUALS ITEMP2      TEMPORARY STORAGE FOR BOUNDED ERROR.
```

R1590 FOR P-AXIS PROGRAM:

```
1591  REF   3 LAST  52          0065  REL      EQUALS ITEMP5      TABLE INDEX USED BY P JET SELECT ROUTINE
1592  REF   3 LAST  52          0066  CTR      EQUALS ITEMP6      TABLE ENTRY COUNTER USED BY P JET SELECT
```

R1593 FOR POLTYPEP PROGRAM:

```
1594  REF   3 LAST  52          0070  TRANONLY EQUALS RUPTREG1    FLAG FOR PURE TRANSLATION REQUESTS
1595  REF   2 LAST  52          0071  ANYTRANS EQUALS RUPTREG2    FLAG TO INDICATE DIRECTION OF TRAN..
1596  REF   4 LAST  53          0072  TRANSNOW EQUALS RUPTREG3    FLAG TO INDICATE TRANS. W/ ROT. POSSIBLE
1597  REF   4 LAST  52          0073  TRANSAVE EQUALS RUPTREG4    FLAG AND HOLDER FOR SAVED TRANS. POLICY
1598  REF   7 LAST  57          0061  NETACNDX EQUALS ITEMP1      INDEX TO INDICATE AXIS, NO., AND DIRECT.
1599  REF   7 LAST  57          0062  TJETADR  EQUALS ITEMP2      GENADR OF RETURN TO TJETLAW
1600  REF   5 LAST  53          0063  POLRELOC EQUALS ITEMP3      POLICY TABLE INDEX (RELATIVE ADDRESS)
1601  REF   4 LAST  52          0064  LOOPCTR  EQUALS ITEMP4      NUMBER OF ALTERNATE POLICIES.
1602  REF   4 LAST  57          0065  THISPOLY EQUALS ITEMP5      STORED POLICY TO ELIMINATE INDEXING.
1603  REF   4 LAST  57          0066  1/NETACC EQUALS ITEMP6      INV. NET ACC. FOR TJETLAW.

1604  REF   1                   0066  1/NJETAC =      1/NETACC

1605  REF  16 LAST  55        E6,1676 1/2JTSQ  =      1/NET+2Q
1606  REF   1                 E6,1702 1/2JTSR  =      1/NET+2R
1607  REF   1                 E6,1707 1/2JETSU =      1/NET+2U
1608  REF   1                 E6,1713 1/2JETSV =      1/NET+2V
```

R1609 FOR AOSTASK PROGRAM:

```
1610  REF   8 LAST  57          0061  K        EQUALS ITEMP1
1611  REF   9 LAST  57          0061  .1-.05K  EQUALS ITEMP1
1612  REF   8 LAST  57          0062  COEFFA   EQUALS ITEMP2
1613  REF   9 LAST  57          0062  .5-.5COF EQUALS ITEMP2
```

R1614 MPAC DESIGNATIONS FOR AOSJOB:

```
1615  REF  12 LAST  42          0144  JOBAXES  EQUALS MPAC        ADJACENT ENTRY INDEXER.
1616  REF  13 LAST  57          0145  NJPLACE  EQUALS MPAC +1     ONE APART ENTRY INDEXER.
1617  REF  14 LAST  57          0146  TABPLACE EQUALS MPAC +2     THREE APART ENTRY INDEXER.
1618  REF  15 LAST  57          0147  TEMPAOS  EQUALS MPAC +3     - AOS TEMPORARY STORAGE (SCALED AT PI/2)
1619  REF  16 LAST  57          0150  TEMPACC  EQUALS MPAC +4     JET ACCELERATION TEMP.  (SCALED AT PI/2)
1620  REF  17 LAST  57          0151  TEMPNET  EQUALS MPAC +5     NET ACCELERATION TEMP.  (SCALED AT PI/2)
1621  REF  18 LAST  57          0152  ABVLAOSQ EQUALS MPAC +6     -ABVAL(AOSQ) SCALED AT PI/2 RAD/SEC(2).
```

L ERASABLE ASSIGNMENTS USER'S OWN PAGE NO. 47

1622 REF 19 LAST 57 0153 ABVLAOSR EQUALS MPAC +7 -ABVAL(AOSR) SCALED AT PI/2 RAD/SEC(2).

L INPUT/OUTPUT CHANNELS USER'S OWN PAGE NO. 1

```
0001                    0003  HISCALAR EQUALS 3
0002                    0004  LOSCALAR EQUALS 4
00025                   0007  SUPERBNK EQUALS 7          SUPER-BANK.
0003                    0010  OUTO     EQUALS 10
0004                    0011  DSALMOUT EQUALS 11
0005                    0012  CHAN12   EQUALS 12
0006                    0013  CHAN13   EQUALS 13
0007                    0014  CHAN14   EQUALS 14
0008                    0015  MNKEYIN  EQUALS 15
0009                    0016  NAVKEYIN EQUALS 16
0010                    0033  CHAN33   EQUALS 33
0011                    0034  DNTM1    EQUALS 34
0012                    0035  DNTM2    EQUALS 35
R0013  END OF CHANNEL ASSIGNMENTS
```

L INTERRUPT LEAD INS USER'S OWN PAGE NO. 1

```
0001                                        4000        SETLOC 4000

0002                                4000  0 0004 0      INHINT              GO
0003  REF  1                        4001  3 4054 1      CAF    GOBB
0004  REF  1                        4002  56 006 1      XCH    BBANK
0005  REF  1                        4003  1 2163 0      TCF    GOPROG

0006  REF  1                        4004  52 011 0      DXCH   ARUPT        T6RUPT
0007                                4005  0 0006 1      EXTEND
0008  REF  1                        4006  3 5051 0      DCA    T6ADR
0009                                4007  52 006 0      DTCB

0010  REF  2 LAST  60               4010  52 011 0      DXCH   ARUPT        T5RUPT
0011                                4011  0 0006 1      EXTEND
0012  REF  1                        4012  3 1001 1      DCA    T5ADR
0013                                4013  52 006 0      DTCB

0014  REF  3 LAST  60               4014  52 011 0      DXCH   ARUPT        T3RUPT
0015  REF  1                        4015  3 4056 0      CAF    T3RPTBB
0016  REF  2 LAST  60               4016  56 006 1      XCH    BBANK
0017  REF  1                        4017  1 3577 0      TCF    T3RUPT

0018  REF  4 LAST  60               4020  52 011 0      DXCH   ARUPT        T4RUPT
0019  REF  1                        4021  3 4063 0      CAF    T4RPTBB
00195 REF  3 LAST  60               4022  56 006 1      XCH    BBANK
0020  REF  1                        4023  1 2000 1      TCF    T4RUPT

0023  REF  5 LAST  60               4024  52 011 0      DXCH   ARUPT        KEYRUPT1
0024  REF  1                        4025  3 4057 1      CAF    KEYRPTBB
0025  REF  4 LAST  60               4026  56 006 1      XCH    BBANK
0026  REF  1                        4027  1 3474 1      TCF    KEYRUPT1

0027  REF  6 LAST  60               4030  52 011 0      DXCH   ARUPT        KEYRUPT2
0028  REF  1                        4031  3 4060 0      CAF    MKRUPTBB
0029  REF  5 LAST  60               4032  56 006 1      XCH    BBANK
0030  REF  1                        4033  1 3221 1      TCF    MARKRUPT

0031  REF  7 LAST  60               4034  52 011 0      DXCH   ARUPT        UPRUPT
0032  REF  1                        4035  3 4057 1      CAF    UPRPTBB
0033  REF  6 LAST  60               4036  56 006 1      XCH    BBANK
0034  REF  1                        4037  1 3514 0      TCF    UPRUPT

0035  REF  8 LAST  60               4040  52 011 0      DXCH   ARUPT        DOWNRUPT
0036  REF  1                        4041  3 4061 1      CAF    DWNRPTBB
0037  REF  7 LAST  60               4042  56 006 1      XCH    BBANK
0038  REF  1                        4043  1 2001 0      TCF    DODOWNTM

0039  REF  9 LAST  60               4044  52 011 0      DXCH   ARUPT        RADAR RUPT
0040  REF  1                        4045  3 4062 1      CAF    RDRPTBB
0041  REF  8 LAST  60               4046  56 006 1      XCH    BBANK
```

L INTERRUPT LEAD INS USER'S OWN PAGE NO. 2

```
0042  REF  1                    4047  1 5736 1          TCF     NOQRSM +1       WAS TCF RADAREAD (NO RADAR IN 206).

R00421  TRAPS 31B AND 32 SHOULD NEVER BE SET. THEREFORE-
R00422  RUPT 10 WILL ALWAYS REFER TO THE HAND CONTROLLER CPD OR MINIMUM IMPULSE
R00423  USE. SEE GEORGE CHERRY FOR RATIONALE REGARDING THE AFORESAID.

0043  REF  10 LAST  60         4050  52 011 0          DXCH    ARUPT           RUPT 10 USED FOR RHC MINIMP MODE ONLY.
0044  REF  1                   4051  3 7762 0          CAF     TWO
0045  REF  1                   4052  55,007 0          TS      DELAYCTR
0046  REF  1                   4053  1 5737 0          TCF     NOQBRSM

0047  REF  1                         E3                EBANK=  LST1            RESTART USES E0, E3
0048  REF  2 LAST  60          4054  02003 0  GOBB       BBCON   GOPROG

0049  REF  1                         E0                EBANK=  TIME1
0050  REF  1                   4055  04000 0  T6RPTBB   BBCON   RESUME          ***FIX LATER***

0051  REF  2 LAST  61                E3                EBANK=  LST1
0052  REF  2 LAST  60          4056  02003 0  T3RPTBB   BBCON   T3RUPT

0053  REF  1                         E0                EBANK=  KEYTEMP1
0054  REF  2 LAST  60          4057  26000 0  KEYRPTBB  BBCON   KEYRUPT1

0055  REF  1                         E3                EBANK=  AOTA7
0056  REF  2 LAST  60          4060  26003 0  MKRUPTBB  BBCON   MARKRUPT

0057  REF  2 LAST  60                4057  UPRPTBB   =       KEYRPTBB

0058  REF  1                         E7                EBANK=  DNTMRUFF
0059  REF  2 LAST  60          4061  32007 1  DWNRPTBB  BBCON   DODOWNTM

0060  REF  1                         E1                EBANK=  RADMODES
0061  REF  1                   4062  20001 1  RDRPTBB   BBCON   RADAREAD

0062  REF  1                         E6                EBANK=  M11
0063  REF  1                   4063  24006 1  T4RPTBB   BBCON   T4RUPTA
```

L RESTART TABLES AND RESTARTS ROUTINE USER'S OWN PAGE NO. 1

```
R0001   RESTART TABLES
R0002    DO NOT REMOVE FROM THE BEGINNING OF THIS BANK
R0003   ----------------

R0004   THERE ARE TWO FORMS OF RESTART TABLES FOR EACH GROUP.  THEY ARE KNOWN AS THE EVEN RESTART TABLES AND THE ODD
R0006   RESTART TABLES.  THE ODD TABLES HAVE ONLY ONE ENTRY OF THREE LOCATIONS WHILE THE EVEN TABLES HAVE TWO ENTRIES
R0008   EACH USING THREE LOCATIONS. THE INFORMATION AS TO WHETHER IT IS A JOB, WAITLIST, OR A LONGCALL IS GIVEN BY THE
R0010   WAY THINGS ARE PUT INTO THE TABLES.
R0011        A JOB HAS ITS PRIORITY STORED IN PRDTTAB OF THE CORRECT PHASE SPOT WITH ITS 2CADR IN THE CADRTAB. FOR
R0013   EXAMPLE.

A0014                                   5.7SPOT  OCT    23000
A0015                                            2CADR  SOMEJOB

R0016   A RESTART OF GROUP 5 WITH PHASE SEVEN WOULD THEN CAUSE SOMEJOB TO BE RESTARTED WITH A PRIORITY OF 23.

R0018   A LONGCALL HAS ITS GENADR OF ITS 2CADR STORED NEGATIVELY AND ITS BBCON STORED POSITIVELY.  IN ITS PRDTTAB IS
R0020   PLACED THE LOCATION OF A DP REGISTER THAT CONTAINS THE DELTA TIME THAT LONGCALL HAD BEEN ORIGINALLY STARTED
R0022   WITH.  EXAMPLE.

A0023                                   3.6SPOT  GENADR DELTAT
A0024                                           -GENADR LONGTASK
A0025                                            BBCON  LONGTASK

A0026                                            OCT    31000
A0027                                            2CADR  JOBAGAIN

R0028   THIS WOULD START UP LONGTASK AT THE APPROPRIATE TIME, OR IMMEDIATELY IF THE TIME HAD ALREADY PASSED. IT SHOULD
R0030   BE NOTED THAT IF DELTAT IS IN A SWITCHED E BANK, THIS INFORMATOIN SHOULD BE IN THE BBCON OFTHE 2CADR OF THE
R0032   TASK.  FROM ABOVE, WE SEE THAT THE SECOND PART OF THIS PHASE WOULD BE STARTED AS A JOB WITH A PRIORITY OF 31.

R0034   WAITLIST CALLS ARE IDENTIFIED BY THE FACT THAT THEIR 2CADR IS STORED NEGATIVELY. IF PRDTTAB OF THE PHASE SPOT
R0036   IS POSITIVE, THEN IT CONTAINS THE DELTA TIME, IF PRDTTAB IS NEGATIVE THEN IT IS THE -GENADR OF AN ERASABLE
R0038   LOCATION CONTAINING THE DELTA TIME, THAT IS, THE TIME IS STORED INDIRECTLY.  IT SHOULD BE NOTED AS ABOVE, THAT
R0040   IF THE TIME IS STORED INDIRECTLY, THE BBCON MUST CONTAIN THE NECESSARY E BANK INFORMATION IF APPLICABLE.  WITH
R0042   WAITLIST WE HAVE ONE FURTHER OPTION, IF -0 IS STORED IN PRDTTAB, IT WILL CAUSE AN IMMEDIATE RESTART OF THE
R0044   TASK.  EXAMPLES.

A0045                                            OCT    77777          THIS WILL CAUSE AN IMMEDIATE RESTART
A0046                                           -2CADR  ATASK          OF THE TASK :ATASK:

A0047                                            DEC    200            IF THE TIME OF THE 2 SECONDS SINCE DUMMY
A0048                                           -2CADR  DUMMY          WAS PUT ON WAITLIST IS UP, IT WILL BEGIN
A0049                                                                  IN 10 MS, OTHERWISE IT WILL BEGIN WHEN
A0050                                                                  IT NORMALLY WOULD HAVE BEGUN.

A0051                                           -GENADR DTIME          WHERE DTIME CONTAINS THE DELTA TIME
A0052                                           -2CADR  TASKTASK       OTHERWISE THIS IS AS ABOVE

R0053   *****    NOW THE TABLES THEMSELVES *****
```

L RESTART TABLES AND RESTARTS ROUTINE USER'S OWN PAGE NO. 2

```
 0054                                  06,2000  PRDTTAB  EQUALS 24000          USED TO FIND THE PRIORITY OR DELTA TIME
 0055                                  06,2001  CADRTAB  EQUALS 24001          THIS AND THE NEXT LOCATION (RELATIVE)
A0056                                                                             CONTAIN THE RESTART CADR

 0057                                  06,2000           BANK   06

 0058  REF  3 LAST  61                    E3           EBANK= LST1             GOPROG MUST SWITCH IN THIS EBANK

 0059  REF  1                 06,2000  02627 0  PHS2CADR GENADR PHSPART2        DO NOT REMOVE THE FOLLOWING 6 LOCATIONS
 0060  REF  1                 06,2001  02414 1  PRT2CADR GENADR GETPART2           FROM BEGINNING OF BANK
 0061  REF  1                 06,2002  05741 0  LGCLCADR GENADR LONGCALL
 0062  REF  1                 06,2003  05516 0  FVACCADR GENADR FINDVAC
 0063  REF  1                 06,2004  05663 1  WTLTCADR GENADR WAITLIST
 0064  REF  1                 06,2005  0 5221 0 RTRNCADR TC     SWRETURN

 0065                         06,2006  10000 0  1,2SPOT  OCT    10000           TEMPORARY ENTRY TO ESTABLISH TABLE
 0066  REF  4 LAST  63                    E3           EBANK= LST1
 0067                         06,2007  05576 0           2CADR  DUMMYJOB
C0067  REF  1                 06,2010  04003 0
 0068                         06,2011  10000 0           OCT    10000
 0069  REF  5 LAST  63                    E3           EBANK= LST1
 0070                         06,2012  05576 0           2CADR  DUMMYJOB
C0070  REF  2 LAST  63        06,2013  04003 0
R0071  ANY MORE GROUP 1,EVEN RESTART VALUES SHOULD GO HERE

 0072                         06,2014  00303 1  1,3SPOT  DEC    195
 0073  REF  8 LAST  42                    E5           EBANK= ETHRNT
 0074                         06,2015  74321 1          -2CADR  PCNTOVER
C0074  REF  1                 06,2016  17712 0
R0075  ANY MORE GROUP 1,ODD RESTART VALUES SHOULD GO HERE

 0076                         06,2017  20000 0  2,2SPOT  OCT    20000
 0077  REF  2 LAST  35                    E4           EBANK= TDEC
 0078                         06,2020  02063 0           2CADR  11REDO2
C0078  REF  1                 06,2021  74064 0
 0079  REF  1                 06,2022  01304 1           GENADR TDECTEMP
 0080  REF  1                 06,2023  75657 1          -GENADR TIG11-30
 0081  REF  3 LAST  63                    E4           EBANK= TDEC
 0082  REF  2 LAST  63        06,2024  74064 0           BBCON  TIG11-30

 0083                         06,2025  15530 0  2,4SPOT  DEC    7000
 0084  REF  4 LAST  63                    E4           EBANK= TDEC
 0085                         06,2026  74741 0          -2CADR  POSTKALC
C0085  REF  1                 06,2027  11713 1
 0086                         06,2030  20000 0           OCT    20000
 0087  REF  5 LAST  63                    E4           EBANK= TDEC
 0088                         06,2031  03023 0           2CADR  CALLKALC
C0088  REF  1                 06,2032  66064 0
R0089  ANY MORE GROUP 2,EVEN RESTART VALUES SHOULD GO HERE
```

L RESTART TABLES AND RESTARTS ROUTINE USER'S OWN PAGE NO. 3 E3

```
0090                          06,2033  77777 0  2.3SPOT  OCT     77777        MISSION SCHEDULING PACKAGE TO SET UP
0091  REF   6 LAST  63                    E3            EBANK=  LST1
0092                          06,2034  75646 1          =2CADR  REDOMDUE
C0092 REF   1                 06,2035  15714 1
0093                          06,2036  12574 1  2.5SPOT  DEC     5500
0094  REF   6 LAST  63                    E4            EBANK=  TDEC
0095                          06,2037  75123 0          =2CADR  S1VB2
C0095 REF   1                 06,2040  25773 0
0096                          06,2041  77777 0  2.7SPOT  OCT     77777
0097  REF   7 LAST  64                    E4            EBANK=  TDEC
0098                          06,2042  75614 0          =2CADR  SBORRA
C0098 REF   1                 06,2043  25773 0
0099                          06,2044  00620 0  2.11SPOT DEC     400
0100  REF   8 LAST  64                    E4            EBANK=  TDEC
0101                          06,2045  75470 0          =2CADR  SBORRB
C0101 REF   1                 06,2046  25773 0
0102  REF   2 LAST  33        06,2047  76035 0  2.13SPOT=GENADR  DT=LIFT
0103  REF   1                          E3            EBANK=  TGRR
0104                          06,2050  75554 1          =2CADR  LIFTOFF
C0104 REF   1                 06,2051  21774 0
0105                          06,2052  01274 1  2.15SPOT DEC     700
0106  REF   9 LAST  64                    E4            EBANK=  TDEC
0107                          06,2053  75426 0          =2CADR  TIG4_41
C0107 REF   1                 06,2054  11713 1
0108                          06,2055  00310 0  2.17SPOT DEC     200
0109  REF  10 LAST  64                    E4            EBANK=  TDEC
0110                          06,2056  75361 1          =2CADR  TIG4_34
C0110 REF   1                 06,2057  11713 1
0111                          06,2060  77777 0  2.21SPOT OCT     77777
0112  REF  11 LAST  64                    E4            EBANK=  TDEC
0113                          06,2061  75621 0          =2CADR  DPSTART
C0113 REF   1                 06,2062  03713 1
0114                          06,2063  01356 0  2.23SPOT DEC     750
0115  REF  12 LAST  64                    E4            EBANK=  TDEC
0116                          06,2064  75566 0          =2CADR  TIG11
C0116 REF   1                 06,2065  03713 1
0117                          06,2066  77777 0  2.25SPOT OCT     77777
0118  REF  13 LAST  64                    E4            EBANK=  TDEC
0119                          06,2067  75361 1          =2CADR  MP11HOLD
C0119 REF   1                 06,2070  03713 1
0120                          06,2071  00144 0  2.27SPOT DEC     100
0121  REF  14 LAST  64                    E4            EBANK=  TDEC
0122                          06,2072  75314 0          =2CADR  MP11OUT
C0122 REF   1                 06,2073  03713 1
0123                          06,2074  20000 0  2.31SPOT OCT     20000
0124  REF  15 LAST  64                    E4            EBANK=  TDEC
0125                          06,2075  02017 0          2CADR   11RED01
C0125 REF   1                 06,2076  74064 0
0126                          06,2077  20000 0  2.33SPOT OCT     20000
0127  REF  16 LAST  64                    E4            EBANK=  TDEC
```

L RESTART TABLES AND RESTARTS ROUTINE USER'S OWN PAGE NO. 4 E3

```
 0128                          06,2100  02032 1          2CADR  INTRTN
C0128  REF   1                 06,2101  74064 0
 0129  REF   2 LAST  63        06,2102  01304 1  2.35SPOT GENADR TDECTEMP
 0130  REF   3 LAST  63        06,2103  75657 1          -GENADR TIG11-30
 0131  REF  17 LAST  64                    E4           EBANK= TDEC
 0132  REF   4 LAST  65        06,2104  74064 0          BBCON  TIG11-30

 0133                          06,2105  77777 0  2.37SPOT DCT    77777
 0134  REF  18 LAST  65                    E4           EBANK= TDEC
 0135                          06,2106  75453 1          -2CADR  MOVENDX
C0135  REF   1                 06,2107  03713 1
 0136                          06,2110  01750 1  2.41SPOT DEC    1000
 0137  REF  19 LAST  65                    E4           EBANK= TDEC
 0138                          06,2111  75445 0          -2CADR  CCSMPRET
C0138  REF   1                 06,2112  03713 1
 0139                          06,2113  15530 0  2.43SPOT DEC    7000
 0140  REF  20 LAST  65                    E4           EBANK= TDEC
 0141                          06,2114  74741 0          -2CADR  POSTKALC
C0141  REF   2 LAST  63        06,2115  11713 1
 0142                          06,2116  02114 1  2.45SPOT DEC    1100
 0143  REF  21 LAST  65                    E4           EBANK= TDEC
 0144                          06,2117  74665 1          -2CADR  182LMP
C0144  REF   1                 06,2120  11713 1
 0145                          06,2121  11610 0  2.47SPOT DEC    5000
 0146  REF  22 LAST  65                    E4           EBANK= TDEC
 0147                          06,2122  74327 1          -2CADR  228LMP
C0147  REF   1                 06,2123  11713 1
 0148                          06,2124  00062 0  2.51SPOT DEC    50
 0149  REF   1                           E2           EBANK= AVGEXIT
 0150                          06,2125  74535 1          -2CADR  9ULLOFF
C0150  REF   1                 06,2126  11715 1
 0151                          06,2127  00372 1  2.53SPOT DEC    250
 0152  REF   2 LAST  65                    E2           EBANK= AVGEXIT
 0153                          06,2130  74527 1          -2CADR  9EDBATT
C0153  REF   1                 06,2131  11715 1
 0154  REF   3 LAST  65        06,2132  76473 0  2.55SPOT-GENADR TDECTEMP
 0155  REF  23 LAST  65                    E4           EBANK= TDEC
 0156                          06,2133  74437 1          -2CADR  CUTOFF
C0156  REF   1                 06,2134  11713 1
 0157                          06,2135  00764 1  2.57SPOT DEC    500
 0158  REF  24 LAST  65                    E4           EBANK= TDEC
 0159                          06,2136  74415 1          -2CADR  87LMD
C0159  REF   1                 06,2137  11713 1
 0160                          06,2140  77777 0  2.61SPOT DCT    77777
 0161  REF   2 LAST  64                    E3           EBANK= TGRR
 0162                          06,2141  75547 0          -2CADR  REDO2.61
C0162  REF   1                 06,2142  21774 0
 0163                          06,2143  77777 0  2.63SPOT DCT    77777
 0164  REF   3 LAST  65                    E3           EBANK= TGRR
 0165                          06,2144  75534 1          -2CADR  REDO2.63
C0165  REF   1                 06,2145  21774 0
```

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R0166   ANY MORE GROUP 2,ODD RESTART VALUES SHOULD GO HERE

 0167   REF   1                        06,2006  3,2SPOT  EQUALS 1,2SPOT
R0168   ANY MORE GROUP 3,EVEN RESTART VALUES SHOULD GO HERE

 0169                          06,2146  00062 0  3,3SPOT  DEC     50
 0170   REF  25 LAST  65                E4               EBANK=  TDEC
 0171                          06,2147  75415 0           =2CADR  ABMON
C0171   REF   1               06,2150  03713 1
 0172                          06,2151  77777 0  3,5SPOT  OCT     77777
 0173   REF  26 LAST  66                E4               EBANK=  TDEC
 0174                          06,2152  75307 1           =2CADR  TUMTASK
C0174   REF   1               06,2153  17713 1
 0175   REF   1               06,2154  01743 0  3,7SPOT  GENADR  DT=LFTJT
 0176   REF   1               06,2155  75507 1           =GENADR  POSTLET
 0177   REF   4 LAST  65                E3               EBANK=  TGRR
 0178   REF   2 LAST  66      06,2156  56003 1           BBCON   POSTLET

 0179                          06,2157  77777 0  3,11SPOT OCT     77777
 0180   REF   1                         E2               EBANK=  MTIMER4
 0181                          06,2160  75740 0           =2CADR  REDO3,11
C0181   REF   1               06,2161  15715 0
 0182                          06,2162  00144 0  3,13SPOT DEC     100
 0183   REF   2 LAST  66                E2               EBANK=  MTIMER4
 0184                          06,2163  75777 1           =2CADR  MMAINT
C0184   REF   1               06,2164  15715 0
 0185                          06,2165  02260 1  3,15SPOT DEC     1200
 0186   REF  27 LAST  66                E4               EBANK=  TDEC
 0187                          06,2166  75224 1           =2CADR  NEXLMP
C0187   REF   1               06,2167  03713 1
 0188                          06,2170  00310 0  3,17SPOT DEC     200
 0189   REF  28 LAST  66                E4               EBANK=  TDEC
 0190                          06,2171  75215 0           =2CADR  NEXLMP1
C0190   REF   1               06,2172  03713 1
 0191                          06,2173  00144 0  3,21SPOT DEC     100
 0192   REF  29 LAST  66                E4               EBANK=  TDEC
 0193                          06,2174  75207 0           =2CADR  NEXLMP2
C0193   REF   1               06,2175  03713 1
 0194                          06,2176  13560 0  3,23SPOT DEC     6000
 0195   REF  30 LAST  66                E4               EBANK=  TDEC
 0196                          06,2177  75200 1           =2CADR  NEXLMP3
C0196   REF   1               06,2200  03713 1
 0197                          06,2201  00144 0  3,25SPOT DEC     100
 0198   REF  31 LAST  66                E4               EBANK=  TDEC
 0199                          06,2202  75232 0           =2CADR  MP11TASK
C0199   REF   1               06,2203  03713 1
 0200                          06,2204  20000 0  3,27SPOT OCT     20000
 0201   REF   3 LAST  44                E5               EBANK=  XSM
 0202                          06,2205  02651 1           2CADR   REDO3,27
C0202   REF   1               06,2206  72065 1
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 0203                          06,2207   77777 0  3.31SPOT OCT    77777
 0204   REF   1                                             EBANK= TTGO
 0205                          06,2210   74326 0           =2CADR  DUMMY13
C0205   REF   1                06,2211   21773 1
 0206                          06,2212   04704 0  3.33SPOT DEC    2500
 0207   REF   2 LAST  67                                     EBANK= TTGO
 0208                          06,2213   74272 0           =2CADR  TRMDMY13
C0208   REF   1                06,2214   21773 1
R0209   ANY MORE GROUP 3,ODD RESTART VALUES SHOULD GO HERE

 0210   REF   2 LAST  66                06,2006  4.2SPOT  EQUALS 1.25POT

R0211   ANY MORE GROUP 4,EVEN RESTART VALUES SHOULD GO HERE

 0212                          06,2215   30000 1  4.3SPOT  OCT    30000
 0213   REF   9 LAST  63                                     EBANK= ETHROT
 0214                          06,2216   03540 0           2CADR   ACCL.JOB
C0214   REF   1                06,2217   60065 1
 0215                          06,2220   10000 0  4.5SPOT  OCT    10000
 0216   REF   1                                             EBANK= RATETNDX
 0217                          06,2221   02670 1           2CADR   COLDSOAK
C0217   REF   1                06,2222   56003 1
 0218                          06,2223   15000 0  4.7SPOT  OCT    15000
 0219   REF   5 LAST  66                                     EBANK= TGRR
 0220                          06,2224   02056 0           2CADR   MP2JOB
C0220   REF   1                06,2225   56003 1
 0221                          06,2226   25000 0  4.11SPOT OCT    25000
 0222   REF  10 LAST  67                                     EBANK= ETHROT
 0223                          06,2227   03507 0           2CADR   PCNT.JOB
C0223   REF   1                06,2230   60065 1
 0224   REF   4 LAST  65       06,2231   01304 1  4.13SPOT GENADR  TDECTEMP
 0225   REF   1                06,2232   74643 0           =GENADR TIG9-66
 0226   REF  32 LAST  66                                     EBANK= TDEC
 0227   REF   2 LAST  67       06,2233   66064 0           BBCON   TIG9-66

 0228                          06,2234   27000 1  4.15SPOT OCT    27000
 0229   REF  33 LAST  67                                     EBANK= TDEC
 0230                          06,2235   03157 1           2CADR   ORBINTJB
C0230   REF   1                06,2236   66064 0
 0231   REF   5 LAST  67       06,2237   76472 1  4.17SPOT=GENADR  TDECTEMP +1
 0232   REF   3 LAST  65                                     EBANK= AVGEXIT
 0233                          06,2240   74547 1           =2CADR  TIG9-0
C0233   REF   1                06,2241   11715 1
R0234   ANY MORE GROUP 4,ODD RESTART VALUES SHOULD GO HERE

 0235                          06,2242   21000 1  5.2SPOT  OCT    21000
 0236   REF   1                                             EBANK= RAVEGON
 0237                          06,2243   02412 1           2CADR   NORMLIZE
C0237   REF   1                06,2244   60064 0
 0238                          06,2245   00310 0           DEC     200
```

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```
 0239   REF  1                          E5          EBANK=  DVCNTR
 0240                          06,2246  75144 1     -2CADR  REREADAC
C0240   REF  1                          06,2247  17712 0
 0241                          06,2250  00310 0  5.4SPOT  DEC     200
 0242   REF  1                          E5          EBANK=  BMEMORY
 0243                          06,2251  75777 1     -2CADR  PRERFAD
C0243   REF  1                          06,2252  17712 0
 0244                          06,2253  32000 0     OCT     32000
 0245   REF  7 LAST  64                 E3          EBANK=  LST1
 0246                          06,2254  03575 0     2CADR   LASTBIAS
C0246   REF  1                          06,2255  24003 1
 0247                          06,2256  00310 0  5.6SPOT  DEC     200
 0248   REF  2 LAST  68                 E5          EBANK=  DVCNTR
 0249                          06,2257  75144 1     -2CADR  REREADAC
C0249   REF  2 LAST  68                 06,2260  17712 0
 0250                          06,2261  20000 0     OCT     20000
 0251   REF  3 LAST  68                 E5          EBANK=  DVCNTR
 0252                          06,2262  02133 1     2CADR   SERVTCER
C0252   REF  1                          06,2263  60065 1
R0253   ANY MORE GROUP 5.EVEN RESTART VALUES SHOULD GO HERE

 0254                          06,2264  00310 0  5.3SPOT  DEC     200
 0255   REF  4 LAST  68                 E5          EBANK=  DVCNTR
 0256                          06,2265  75144 1     -2CADR  REREADAC
C0256   REF  3 LAST  68                 06,2266  17712 0
 0257                          06,2267  00000 1  5.5SPOT  2DEC    0          5.5 SPOT NOT USED
C0257                          06,2270  00000 1
 0258                          06,2271  00000 1     DEC     0

 0259                          06,2272  20000 0  5.7SPOT  OCT     20000
 0260   REF  4 LAST  66                 E5          EBANK=  XSM
 0261                          06,2273  02020 1     2CADR   RSTGTS1
C0261   REF  1                          06,2274  72065 1
 0262                          06,2275  77777 0  5.11SPOT OCT     77777
 0263   REF  5 LAST  68                 E5          EBANK=  XSM
 0264                          06,2276  75706 1     -2CADR  ALLOOP1
C0264   REF  1                          06,2277  05712 0
 0265                          06,2300  20000 0  5.13SPOT OCT     20000
 0266   REF  6 LAST  68                 E5          EBANK=  XSM
 0267                          06,2301  02727 1     2CADR   WTLISTNT
C0267   REF  1                          06,2302  72065 1
 0268                          06,2303  20000 0  5.15SPOT OCT     20000
 0269   REF  7 LAST  68                 E5          EBANK=  XSM
 0270                          06,2304  02757 0     2CADR   NOCHORLD
C0270   REF  1                          06,2305  72065 1
 0271                          06,2306  20000 0  5.17SPOT OCT     20000
 0272   REF  8 LAST  68                 E5          EBANK=  XSM
 0273                          06,2307  02710 0     2CADR   GEOSTRT4
C0273   REF  1                          06,2310  72065 1
 0274                          06,2311  20000 0  5.21SPOT OCT     20000
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 0275   REF   9 LAST  68                    E5          EBANK=  XSM
 0276                          06,2312   02126 0          2CADR  ALFLT1
C0276   REF   1                06,2313   72065 1
 0277                          06,2314   77777 0  5.23SPOT OCT    77777
 0278   REF  10 LAST  69                    E5          EBANK=  XSM
 0279                          06,2315   75666 0         =2CADR  SPECSTS
C0279   REF   1                06,2316   05712 0
 0280                          06,2317   20000 0  5.25SPOT OCT    20000
 0281   REF  11 LAST  69                    E5          EBANK=  XSM
 0282                          06,2320   02630 0          2CADR  RESTAIER
C0282   REF   1                06,2321   72065 1
 0283                          06,2322   00620 0  5.27SPOT DEC    400
 0284   REF   1                           E5          EBANK=  DVTOTAL
 0285                          06,2323   75777 1         =2CADR  PREREAD
C0285   REF   2 LAST  68       06,2324   17712 0
 0286                          06,2325   77777 0  5.31SPOT OCT    77777
 0287   REF   1                           E5          EBANK=  NEGXOV
 0288                          06,2326   75707 0         =2CADR  REDO5.31
C0288   REF   1                06,2327   17712 0
 0289                          06,2330   77777 0  5.33SPOT OCT    77777
 0290   REF   5 LAST  68                    E5          EBANK=  DVCNTR
 0291                          06,2331   75777 1         =2CADR  PREREAD
C0291   REF   3 LAST  69       06,2332   17712 0
 0292   REF   1                06,2333   76435 1  5.35SPOT=GENADR RSDTTEMP
 0293   REF   2 LAST  69                    E5          EBANK=  DVTOTAL
 0294                          06,2334   75777 1         =2CADR  PREREAD
C0294   REF   4 LAST  69       06,2335   17712 0
 0295                          06,2336   77777 0  5.37SPOT OCT    77777
 0296   REF   6 LAST  67                    E3          EBANK=  TGRR
 0297                          06,2337   75754 0         =2CADR  SETPIPDT
C0297   REF   1                06,2340   21774 0
R0298   ANY MORE GROUP 5,ODD RESTART VALUES SHOULD GO HERE

 0299                          06,2341   00764 1  6.2SPOT  DEC    500
 029901 REF   2 LAST  61                    E7          EBANK=  DNTMRUFF
 029902                        06,2342   75225 0         =2CADR  DAPOFF
C029902 REF   1                06,2343   55770 1
 029903                        06,2344   30000 1          OCT    30000
 029904 REF   3 LAST  69                    E7          EBANK=  DNTMRUFF
 029905                        06,2345   02541 0          2CADR  TGOFF
C029905 REF   1                06,2346   22007 0
R0300   ANY MORE GROUP 6,EVEN RESTART VALUES SHOULD GO HERE

 0301                          06,2347   00764 1  6.3SPOT  DEC    500
 0302   REF   4 LAST  69                    E7          EBANK=  DNTMRUFF
 0303                          06,2350   75225 0         =2CADR  DAPOFF
C0303   REF   2 LAST  69       06,2351   55770 1
 0304                          06,2352   33000 1  6.5SPOT  OCTAL  33000
 0305   REF   1                           E4          EBANK=  STBOFF
 0306                          06,2353   02440 0          2CADR  I=4,CONT
C0306   REF   1                06,2354   54004 1
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```
 0307                          06,2355   30000 1  6,7SPOT  OCT    30000
 0308    REF   2 LAST  69                    E4            EBANK= SIBUFF
 0309                          06,2356   02464 0            2CADR  JPQUITRM
C0309    REF   1               06,2357   54004 1
 030901  REF   1               06,2360   76432 0  6,11SPOT-GENADR DAPDEFDT
 030902  REF   5 LAST  69                    E7            EBANK= DNTMRUFF
 030903                        06,2361   75504 1           -2CADR  11DAPOFF
C030903  REF   1               06,2362   03710 1
R0310    ANY MORE GROUP 6,ODD RESTART VALUES SHOULD GO HERE

 0311    REF   3 LAST  67      06,2363   00000 1  SIZETAB  GENADR 1,2SPOT -24006
 0312    REF   1               06,2364   00010 0           GENADR 1,3SPOT -24004
 0313    REF   1               06,2365   00011 1           GENADR 2,2SPOT -24006
 0314    REF   1               06,2366   00027 1           GENADR 2,3SPOT -24004
 0315    REF   1               06,2367   00000 1           GENADR 3,2SPOT -24006
 0316    REF   1               06,2370   00142 0           GENADR 3,3SPOT -24004
 0317    REF   1               06,2371   00000 1           GENADR 4,2SPOT -24006
 0318    REF   1               06,2372   00211 0           GENADR 4,3SPOT -24004
 0319    REF   1               06,2373   00234 1           GENADR 5,2SPOT -24006
 0320    REF   1               06,2374   00260 0           GENADR 5,3SPOT -24004
 0321    REF   1               06,2375   00333 1           GENADR 6,2SPOT -24006
 0322    REF   1               06,2376   00343 0           GENADR 6,3SPOT -24004
```

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```
P0323
 0324   REF  20 LAST  58     06,2377  3 0151 1  RESTARTS  CA      MPAC +5          GET GROUP NUMBER -1
 0325                        06,2400  6 0000 1            DOUBLE                   SAVE FOR INDEXING
 0326   REF   1              06,2401  54 145 0            TS      TEMP2G

 0327   REF   1              06,2402  3 2003 0            CA      FVACCADR         LET;S ASSUME THIS IS A JOB, THIS WILL
 0328   REF   1              06,2403  54 734 0            TS      GOLOC -1         SAVE US A COUPLE OF LOCATIONS, BUT NOT
A0329                                                                             NECESSARIALY ANY TIME - SO BE IT -

 0330   REF   1              06,2404  3 2000 0            CA      PHS2CADR         SET UP EXIT IN CASE IT IS AN EVEN
 0331   REF   1              06,2405  54 147 1            TS      TEMPSWCH         TABLE PHASE

 0332   REF   1              06,2406  3 2005 0            CA      RTRNCADR         TO SAVE TIME ASSUME IT WILL GET NEXT
 0333   REF   2 LAST  71     06,2407  54 737 0            TS      GOLOC +2         GROUP AFTER THIS

 0334   REF   1              06,2410  3 0144 0            CA      TEMPPHS
 0335   REF   1              06,2411  7 5352 1            MASK    OCT1400
 0336   REF   1              06,2412  10 000 0            CCS     A                IS IT A VARIABLE OR TABLE RESTART
 0337   REF   1              06,2413  1 2424 0            TCF     ITSAVAR          IT;S A VARIABLE RESTART

 0338   REF   2 LAST  71     06,2414  10 144 1  GETPART2  CCS     TEMPPHS          IS IT AN X.1 RESTART
 0339   REF   2 LAST  71     06,2415  10 000 0            CCS     A
 0340   REF   1              06,2416  1 2513 0            TCF     ITSATBL          NO, ITS A TABLE RESTART

 0341   REF   1              06,2417  3 5640 0            CA      PRIO14           IT IS AN X.1 RESTART, THEREFORE START
 0342   REF   2 LAST  63     06,2420  0 5516 0            TC      FINDVAC          THE DISPLAY RESTART JOB
 0343   REF   8 LAST  68                   E3             EBANK=  LST1
 0344                        06,2421   05567 0           2CADR   INITDSP
C0344   REF   1              06,2422   04003 0
 0345   REF   2 LAST  71     06,2423  0 2005 0            TC      RTRNCADR         FINISHED WITH THIS GROUP, GET NEXT ONE

 0346   REF   1                             5567  INITDSP  EQUALS  ENDOFJOB

 0347   REF   2 LAST  71     06,2424  7 5352 1  ITSAVAR   MASK    OCT1400          IS IT TYPE B ?
 0348   REF   3 LAST  71     06,2425  10 000 0            CCS     A
 0349   REF   1              06,2426  1 2475 1            TCF     ITSLIKEB         YES,IT IS TYPE B

 0350                        06,2427  0 0006 1            EXTEND                   STORE THE JOB (OR TASK) 2CADR FOR EXIT
 0351   REF   2 LAST  71     06,2430  5 0145 1            WDX     TEMP2G
 0352   REF   1              06,2431  3 1517 0            QCA     PHSNAME1
 0353   REF   3 LAST  71     06,2432  52 736 1            QXCH    GOLOC

 0354   REF   3 LAST  71     06,2433  3 0144 0            CA      TEMPPHS          SEE IF THIS IS A JOB, TASK, OR A LONGCAL
 0355   REF   1              06,2434  7 7765 0            MASK    OCT7
 0356   REF   1              06,2435  6 5336 1            AD      MINUS2
 0357   REF   4 LAST  71     06,2436  10 000 0            CCS     A
 0358   REF   1              06,2437  1 2576 0            TCF     ITSLNGCL         ITS A LONGCALL

 0359                        06,2440   37776 0  OCT37776  OCT     37776            CANT GET HERE
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0360   REF  1                  06,2441  1 2443 1            TCF    ITSAWAIT
0361   REF  1                  06,2442  1 2510 0            TCF    ITSAJOB          ITS A JOB
0362   REF  1                  06,2443  3 2004 1  ITSAWAIT  CA     WTLTCADR         SET UP WAITLIST CALL
0363   REF  4 LAST  71         06,2444  54 734 0            TS     GOLOC -1
0364   REF  3 LAST  71         06,2445  50 145 1            NDX    TEMP2G           DIRECTLY STORED
0365   REF  1                  06,2446  3 1114 1            CA     PHSPRDT1
0366   REF  5 LAST  71         06,2447  10 000 0  TIMETEST  CCS    A                IS IT AN IMMEDIATE RESTART
0367   REF  6 LAST  72         06,2450  24 000 1            INCR   A                NO,
0368   REF  1                  06,2451  1 2454 1            TCF    FINDTIME         FIND OUT WHEN IT SHOULD BEGIN
0369   REF  1                  06,2452  1 4064 0            TCF    ITSINDIR         STORED INDIRECTLY
0370   REF  1                  06,2453  1 2473 1            TCF    IMEDIATE         IT WANTS AN IMMEDIATE RESTART
R0371  ***** THIS MUST BE IN FIXED FIXED *****
0372                                    4064                BLOCK  02
0373   REF  5 LAST  72          4064    22 736 0  ITSINDIR  LXCH   GOLOC +1         GET THE CORRECT E BANK IN CASE THIS IS
0374   REF  1                   4065    22 006 1            LXCH   BB               SWITCHED ERRASIBLE
0375   REF  7 LAST  72          4066    50 000 1            NDX    A                GET THE TIME INDIRECTLY
0376                            4067    3 0001 0            CA     1
0377   REF  2 LAST  72          4070    22 006 1            LXCH   BB               RESTORE THE BB AND GOLOC
0378   REF  6 LAST  72          4071    22 736 0            LXCH   GOLOC +1
0379   REF  2 LAST  72          4072    1 2454 1            TCF    FINDTIME         FIND OUT WHEN IT SHOULD BEGIN
R0380  ***** YOUB MAY RETURN TO  SWITCHED FIXED *****
0381                                    06,2454             BANK   06
0382                            06,2454 4 0000 0  FINDTIME  COM                     MAKE NEGITIVE SINCE IT WILL BE SUBTRACTD
0383   REF  1                   06,2455 54 001 1            TS     L                AND SAVE
0384   REF  4 LAST  72          06,2456 50 145 1            NDX    TEMP2G
0385   REF  1                   06,2457 4 1113 1            CS     TBASE1
0386                            06,2460 0 0006 1            EXTEND
0387   REF  2 LAST  61          06,2461 60 025 0            SU     TIME1
0388   REF  8 LAST  72          06,2462 10 000 0            CCS    A
0389                            06,2463 4 0000 0            COM
0390   REF  1                   06,2464 6 2440 0            AD     OCT37776
0391   REF  1                   06,2465 6 7763 1            AD     ONE
0392   REF  2 LAST  72          06,2466 6 0001 0            AD     L
0393   REF  9 LAST  72          06,2467 10 000 0            CCS    A
0394   REF  1                   06,2470 3 7767 0            CA     ZERO
0395                            06,2471 1 2473 1            TCF    +2
0396                            06,2472 1 2473 1            TCF    +1
0397   REF  2 LAST  72          06,2473 6 7763 1  IMEDIATE  AD     ONE
```

L RESTART TABLES AND RESTARTS ROUTINE USER'S OWN PAGE NO. 12 E3

```
0398  REF   7 LAST  72    06,2474  0 0734 1            TC     GOLOC -1
0399  REF   3 LAST  71    06,2475  3 2005 0  ITSLIKEB  CA     RTRNCADR      TYPE B,          SO STORE RETURN IN
0400  REF   2 LAST  71    06,2476  54 147 1            TS     TEMPSWCH      TEMPSWCH IN CASE OF AN EVEN PHASE

0401  REF   1             06,2477  3 2001 1            CA     PRT2CADR      SET UP EXIT TO GET TABLE PART OF THIS
0402  REF   8 LAST  73    06,2500  54 737 0            TS     GOLOC +2      VARIABLE TYPE OF PHASE

0403  REF   4 LAST  71    06,2501  3 0144 0            CA     TEMPPHS       MAKE THE PHASE LOOK RIGHT FOR THE TABLE
0404  REF   1             06,2502  7 5342 0            MASK   OCT177        PART OF THIS VARIABLE PHASE
0405  REF   5 LAST  73    06,2503  54 144 1            TS     TEMPPHS

0406                      06,2504  0 0006 1            EXTEND
0407  REF   5 LAST  72    06,2505  5 0145 1            INDX   TEMP2G        OBTAIN THE JOB:S 2CADR
0408  REF   2 LAST  71    06,2506  3 1517 0            DCA    PHSNAME1
0409  REF   9 LAST  73    06,2507  52 736 1            DXCH   GOLOC

0410  REF   6 LAST  73    06,2510  50 145 1  ITSAJOB   INDX   TEMP2G        NOW ADD THE PRIORITY AND LET:S GO
0411  REF   2 LAST  72    06,2511  3 1114 1            CA     PHSPRDT1
0412  REF  10 LAST  73    06,2512  0 0734 1            TC     GOLOC -1

0413  REF   1             06,2513  54 020 1  ITSATBL   TS     CYR           FIND OUT IF THE PHASE IS ODD OR EVEN
0414  REF   2 LAST  73    06,2514  10 020 1            CCS    CYR
0415                      06,2515  1 2516 0            TCF    +1            IT:S EVEN
0416  REF   1             06,2516  1 2616 0            TCF    ITSEVEN

0417  REF   4 LAST  73    06,2517  3 2005 0            CA     RTRNCADR      IN CASE THIS IS THE SECOND PART OF A
0418  REF  11 LAST  73    06,2520  54 737 0            TS     GOLOC +2      TYPE B RESTART, WE NEED PROPER EXIT

0419  REF   6 LAST  73    06,2521  3 0144 0            CA     TEMPPHS       SET UP POINTER FOR FINDING OUR PLACE IN
0420  REF   1             06,2522  54 021 0            TS     SR            THE RESTART TABLES
0421  REF   2 LAST  73    06,2523  6 0021 1            AD     SR
0422  REF   7 LAST  73    06,2524  50 145 1            INDX   TEMP2G
0423  REF   1             06,2525  6 2364 1            AD     SIZETAB +1
0424  REF   1             06,2526  54 146 0            TS     POINTER

0425                      06,2527  0 0006 1  CONTBL2    EXTEND                FIND OUT WHAT:S IN THE TABLE
0426  REF   2 LAST  73    06,2530  5 0146 1            INDX   POINTER
0427  REF   1             06,2531  3 2002 1            DCA    CADRTAB       GET THE 2CADR

0428  REF  12 LAST  73    06,2532  22 736 0            DXCH   GOLOC +1      STORE THE BB INFORMATION

0429  REF  10 LAST  72    06,2533  10 000 0            CCS    A              IS IT A JOB OR IS IT  TIMED
0430  REF  11 LAST  73    06,2534  24 000 1            INCR   A              POSITIVE, MUST BE A JOB
0431  REF   1             06,2535  1 2610 0            TCF    ITSA.IOB2

0432  REF  12 LAST  73    06,2536  24 000 1            INCR   A              MUST BE EITHER A WAITLIST OR LONGCALL
0433  REF  13 LAST  73    06,2537  54 735 1            TS     GOLOC          LET-S STORE THE CORRECT CADR

0434  REF   2 LAST  72    06,2540  3 2004 1            CA     WTLTCADR      SET UP OUR EXIT TO WAITLIST
0435  REF  14 LAST  73    06,2541  54 734 0            TS     GOLOC -1
```

L RESTART TABLES AND RESTARTS ROUTINE USER'S OWN PAGE NO. 13 E3

```
 0436   REF  15 LAST  73        06,2542  3 0736 0            CA     GOLOC +1        NOW FIND OUT IF IT IS A WAITLIST CALL
 0437   REF   1               06,2543  7 7752 1            MASK   BIT10           THIS SHOULD BE ONE IF WE HAVE -3B
 0438   REF  13 LAST  73        06,2544  10 000 0            CCS    A               FOR THAT MATTER SO SHOULD BE BITS 9,8,7,
A0439                                                                              6,5, AND LAST BUT NOT LEAST (PERHAPS NOT
A0440                                                                              IN IMPORTANCE ANYWAY. BIT 4
 0441   REF   1               06,2545  1 2603 1            TCF    ITSWTLST        IT IS A WAITLIST CALL

 0442   REF   3 LAST  73        06,2546  50 146 1            NDX    POINTER         OBTAIN THE ORIGINAL DELTA T
 0443   REF   1               06,2547  3 2000 0            CA     PRDTTAB         ADDRESS FOR THIS LONGCALL

 0444   REF   1               06,2550  1 4073 0            TCF    ITSLGCL1        NOW GO GET THE DELTA TIME

R0445   ***** THIS MUST BE IN FIXED FIXED *****

 0446                                    4073               BLOCK  02
 0447   REF  16 LAST  74        4073  22 736 0  ITSLGCL1   LXCH   GOLOC +1        OBTAIN THE CORRECT E BANK
 0448   REF   3 LAST  72        4074  22 006 1            LXCH   BB
 0449   REF  17 LAST  74        4075  22 736 0            LXCH   GOLOC +1        AND PRESERVE OUR E AND F BANKS

 0450                            4076  0 0006 1            EXTEND                 GET THE DELTA TIME
 0451   REF  14 LAST  74        4077  5 0000 1            NDX    A
 0452                            4100  3 0001 0            DCA    0

 0453   REF  18 LAST  74        4101  22 736 0            LXCH   GOLOC +1        RESTORE OUR E AND F BANK
 0454   REF   4 LAST  74        4102  22 006 1            LXCH   BB              RESTORE THE TASKS E AND F BANKS
 0455   REF  19 LAST  74        4103  22 736 0            LXCH   GOLOC +1        AND PRESERVE OUR L

 0456   REF   1               4104  1 2551 0            TCF    ITSLGCL2        NOW LET'S PROCESS THIS LONGCALL

R0457   ***** YOUB MAY RETURN TO  SWITCHED FIXED *****

 0458                                    06,2551            BANK   06
 0459   REF   1               06,2551  53'154 1  ITSLGCL2  DXCH   LONGTIME

 0460                            06,2552  0 0006 1            EXTEND                 CALCULATE TIME LEFT
 0461   REF   1               06,2553  4 0025 1            DCS    TIME2
 0462   REF   2 LAST  74        06,2554  21'154 1            DAS    LONGTIME
 0463                            06,2555  0 0006 1            EXTEND
 0464   REF   1               06,2556  3 1433 1            DCA    LONGBASE
 0465   REF   3 LAST  74        06,2557  21'154 1            DAS    LONGTIME

 0466   REF   4 LAST  74        06,2560  11'153 0            CCS    LONGTIME        FIND OUT HOW THIS SHOULD BE RESTARTED
 0467   REF   1               06,2561  1 2571 1            TCF    LONGCLCL
 0468                            06,2562  1 2564 0            TCF    +2
 0469   REF   2 LAST  72        06,2563  1 2470 1            TCF    IMEDIATE -3
 0470   REF   5 LAST  74        06,2564  11'154 1            CCS    LONGTIME +1
 0471   REF   2 LAST  74        06,2565  1 2571 1            TCF    LONGCLCL
 0472                            06,2566  1 2567 0            NOOP                   CAN'T GET HERE     *********
 0473   REF   3 LAST  74        06,2567  1 2470 1            TCF    IMEDIATE -3
 0474   REF   4 LAST  74        06,2570  1 2473 1            TCF    IMEDIATE
```

L RESTART TABLES AND RESTARTS ROUTINE USER'S OWN PAGE NO. 14 E3

```
0475  REF   1                 06,2571  3 2002 1  LONGCLCL  CA    LGCLCADR   WE WILL GO TO LONGCALL
0476  REF  20 LAST  74        06,2572  54 734 0            TS    GOLOC -1

0477                          06,2573  0 0006 1            EXTEND           PREPARE OUR ENTRY TO LONGCALL
0478  REF   6 LAST  74        06,2574  3 1154 0            DCA   LONGTIME
0479  REF  21 LAST  75        06,2575  0 0734 1            TC    GOLOC -1

0480  REF   3 LAST  73        06,2576  3 2004 1  ITSLNGCL  CA    WTLTCADR   ASSUME IT WILL GO TO WAITLIST
0481  REF  22 LAST  75        06,2577  54 734 0            TS    GOLOC -1

0482  REF   8 LAST  73        06,2600  50 145 1            NDX   TEMP2G
0483  REF   3 LAST  73        06,2601  4 1114 0            CS    PHSPRDT1   GET THE DELTA T ADDRESS

0484  REF   2 LAST  74        06,2602  1 4073 0            TCF   ITSLGCL1   NOW GET THE DELTA TIME

0485  REF  23 LAST  75        06,2603  4 0736 1  ITSWTLST  CS    GOLOC +1   CORRECT THE BBCON INFORMATION
0486  REF  24 LAST  75        06,2604  54 736 1            TS    GOLOC +1

0487  REF   4 LAST  74        06,2605  50 146 1            NDX   POINTER    GET THE DT AND FIND OUT IF IT WAS STORED
0488  REF   2 LAST  74        06,2606  3 2000 0            CA    PRDTTAB    DIRECTLY OR INDIRECTLY

0489  REF   1                 06,2607  1 2447 0            TCF   TIMETEST   FIND OUT HOW THE TIME IS STORED

0490  REF  25 LAST  75        06,2610  56 735 0  ITSAJ0B2  XCH   GOLOC      STORE THE CADR

0491  REF   2 LAST  71        06,2611  3 2003 0            CA    FVACCADR   STORE TC FINDVAC.
0492  REF  26 LAST  75        06,2612  54 734 0            TS    GOLOC -1

0493  REF   5 LAST  75        06,2613  50 146 1            NDX   POINTER    ADD THE PRIORITY AND LET;S GO
0494  REF   3 LAST  75        06,2614  3 2000 0            CA    PRDTTAB

0495  REF  27 LAST  75        06,2615  0 0734 1            TC    GOLOC -1

0496  REF   3 LAST  73        06,2616  3 0147 0  ITSEVEN   CA    TEMPSWCH   SET UP FOR EITHER THE SECOND PART OF THE
0497  REF  28 LAST  75        06,2617  54 737 0            TS    GOLOC +2   TABLE, OR A RETURN FOR THE NEXT GROUP

0498  REF   9 LAST  75        06,2620  50 145 1            NDX   TEMP2G     SET UP POINTER FOR OUR LOCATION WITHIN
0499  REF   2 LAST  73        06,2621  3 2363 0            CA    SIZETAB    THE TABLE
0500  REF   7 LAST  73        06,2622  6 0144 0            AD    TEMPPHS    THIS MAY LOOK BAD BUT LET;S SEE YOU DO
0501  REF   8 LAST  75        06,2623  6 0144 0            AD    TEMPPHS    BETTER IN TIME OR NUMBERR OF LOCATIONS
0502  REF   9 LAST  75        06,2624  6 0144 0            AD    TEMPPHS
0503  REF   6 LAST  75        06,2625  54 146 0            TS    POINTER

0504  REF   1                 06,2626  1 2527 1            TCF   CONTRL2    NOW PROCESS WHAT IS IN THE TABLE

0505  REF   1                 06,2627  3 6311 1  PHSPART2  CA    THREE      SET THE POINTER FOR THE SECOND HALF OF
0506  REF   7 LAST  75        06,2630  26 146 0            ADS   POINTER    THE TABLE

0507  REF   5 LAST  73        06,2631  3 2005 0            CA    RTRNCADR   THIS WILL BE OUR LAST TIME THROUGH THE
0508  REF  29 LAST  75        06,2632  54 737 0            TS    GOLOC +2   EVEN TABLE , SO AFTER IT  GET THE NEXT
```

L RESTART TABLES AND RESTARTS ROUTINE USER'S OWN PAGE NO. 15 E3

```
A0509                                                                   GROUP
 0510   REF   2 LAST  75      06,2633  1 2527 1          TCF    CONTRL2  SO LET'S GET THE SECOND ENTRY IN THE TBL

 0511   REF  21 LAST  71                0144   TEMPPHS   EQUALS MPAC
 0512   REF  22 LAST  76                0145   TEMP2G    EQUALS MPAC +1
 0513   REF  23 LAST  76                0146   POINTER   EQUALS MPAC +2
 0514   REF  24 LAST  76                0147   TEMPSWCH  EQUALS MPAC +3
 0515   REF   1                         0735   GOLOC     EQUALS VAC5 +20D
 0516   REF   1                         5336   MINUS2    EQUALS NEG2
 0517   REF   1                         5342   OCT177    EQUALS LOW7


R0518   SETRSTRT - RESTART FLAG UP OR DOWN DEPENDING ON CONTENTS OF ERASABLE RSTRTWRD.

R0520   CALLING SEQUENCE
A0521                                                   CAF    BITX     USE BIT CORRESPONDING TO MISS PHASE NUM.
A0522                                                   TC     SETRSTRT

 0523                                   4105            BLOCK  02

 0524   REF   1                 4105  22 002 0  SETRSTRT LXCH   Q
 0525   REF   1                 4106  7 1127 0           MASK   RSTRTWRD
 0526                           4107  0 0006 1           EXTEND
 0527                           4110  1 4114 0           BZF    +4

 0528   REF   1                 4111  0 6051 0           TC     FLAGUP   USER MISSION PHASE IS RESTARTABLE
 0529                           4112   04000 0           OCT    04000
 0530   REF   3 LAST  72        4113  0 0001 0           TC     L

 0531   REF   1                 4114  0 6067 0  +4       TC     FLAGDWN  USER MISSION PHASE NOT RESTARTABLE
 0532                           4115   04000 0           OCT    04000
 0533   REF   4 LAST  76        4116  0 0001 0           TC     L
```

L PHASE TABLE MAINTENANCE USER'S OWN PAGE NO. 1

P0056 SUBROUTINE TO UPDATE THE PROGRAM NUMBER DISPLAY ON THE DSKY.

```
00569                                    4117          BLOCK  02
0057   REF  2 LAST  76        4117  50 002 0  NEWMODEX INDEX  Q             UPDATE MODREG. ENTRY FOR MODE IN FIXED.
0058                          4120  3 0000 1          CAF    0
0059   REF  3 LAST  77        4121  24 002 0          INCR   Q

0060   REF  1                 4122  56 302 0  NEWMODEA XCH    MODREG        ENTRY FOR MODE IN A
0061                          4123  4 0000 0          COM                   IF NO CHANGE IN MODE, RETURN IMMEDIATELY
0062   REF  2 LAST  77        4124  6 0302 0          AD     MODREG
0063                          4125  0 0006 1          EXTEND
0064   REF  1                 4126  1 7020 0          BZF    TCQ

00645                         4127  3 4132 0          CAF    +3            CALL PINBALL SUBROUTINE
0065   REF  9 LAST  60        4130  22 006 1  PREBJUMP LXCH   BBANK         PUTS BBANK IN L
0066   REF  1                 4131  1 5230 1          TCF    BANKJUMP      PUTS Q INTO A
0067   REF  1                 4132   72000 1          CADR   SETUPDSP
```

R0068 RETURN TO CALLER +3 IF MODE = THAT AT CALLER +1. OTHERWISE RETURN TO CALLER +2.

```
0070   REF  4 LAST  77        4133  50 002 0  CHECKMM  INDEX  Q
0071                          4134  4 0000 0          CS     0
0072   REF  3 LAST  77        4135  6 0302 0          AD     MODREG
0073                          4136  0 0006 1          EXTEND
0074   REF  1                 4137  1 7017 1          BZF    Q+2
0075   REF  1                 4140  1 7015 0          TCF    Q+1           NO MATCH

0078   REF  2 LAST  77                7020  TCQ       =      Q+2 +1

00781                                35,2000          BANK   35

00782                         35,2000  0 0004 0  SETUPDSP INHINT
00824  REF  4 LAST  57        35,2001  52 071 0          DXCH   RUPTREG1       SAVE CALLER-S RETURN 2CADR
00783  REF  1                 35,2002  3 5210 1          CAF    PRIO30           EITHER A TASK OR JOB CAN COME TO
0078 4 REF  1                 35,2003  0 5505 1          TC     NOVAC            NEWMODEX
00785  REF  4 LAST  77                      E0          EBANK= MODREG
00786                         35,2004   02011 0          2CADR  DSPMMJOB
C00786 REF  1                 35,2005   72060 1
007864 REF  5 LAST  77        35,2006  52 071 0          DXCH   RUPTREG1
00787                         35,2007  0 0003 1          RELINT
00788  REF  1                 35,2010  52 006 0          DXCH   Z             RETURN

007892 REF  1                 35,2011  0 5206 0  DSPMMJOB TC     BANKCALL
007894 REF  1                 35,2012   13403 1          CADR   DSPMM1
007896 REF  2 LAST  71        35,2013  1 5567 1          TCF    ENDOFJOB

007898                                   4141          BLOCK  02
```

L PHASE TABLE MAINTENANCE USER'S OWN PAGE NO. 2 53

```
P0079  PHASCHNG IS THE MAIN WAY OF MAKING PHASE CHANGES FOR RESTARTS.  THERE ARE THREE FORMS OF PHASCHNG, KNOWN AS TYPE
R0081  A, TYPE B, AND TYPE C.  THEY ARE ALL CALLED AS FOLLOWS, WHERE OCT XXXXX  CONTAINS THE PHASE INFORMATION.

A0083                                          TC     PHASCHNG
A0084                                          OCT    XXXXX

R0085  TYPE A IS CONCERNED WITH FIXED PHASE CHANGES, THAT IS, PHASE INFORMATIONTHAT IS STORED PERMANENTLY.  THESE
R0087  OPTIONS ARE, WHERE G STANDS FOR A GROUP AND .X FOR THE PHASE.

R0088                  G.0             INACTIVE, WILLNOT PERMIT A GROUP G RESTART
R00891                 G.1             WILL CAUSE THE LAST DISPLAY TO BE REACTIVATED, USED MAINLY IN MANNED FLIGHTS
R0091                  G.EVEN          A DOUBLE TABLE RESTART, CAN CAUSE ANY COMBINATION OF TWO JOBS, TASKS, AND/OR
R0093                                  LONGCALL TO BE RESTARTED.
R0094                  G.ODD NOT .1    A SINGLE TABLE RESTART, CAN CAUSE EITHER A JOB, TASK, OR LONGCALL RESTART

R0095  THIS INFORMATION IS PUT INTO THE OCTAL WORD AFTER TC PHASCHNG AS FOLLOWS

R0096                  TLO OOP PPP PPP GGG

R0099  WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G;S STAND FOR THE GROUP, OCTAL 1 - 7, THE P;S FOR THE PHASE,
R0101  OCTAL 0 - 127.  O;S MUST BE 0.          IF ONE WISHES TO HAVE THE TBASE OF GROUP G TO BE SET AT THIS TIME,
R0104  T IS SET TO 1, OTHERWISE IT IS SET TO 0.  SIMIARLY IF ONE WISHES TO SET LONGBASE, THEN L IS SET TO 1, OTHERWISE
R0106  IT IS SET TO 0.  SOME EXAMPLES,

A0107                                          TC     PHASCHNG    THIS WILL CAUSE GROUP 3 TOBE SET TO 0,
A0108                                          OCT    00003       MAKING GROUP 3 INACTIVE

A0109                                          TC     PHASCHNG    IF A RESTART OCCURS THIS WOULD CAUSE
A0110                                          OCT    00012       GROUP 2 TO RESTART THE LAST DISPLAY

A0111                                          TC     PHASCHNG    THIS SETS THE TBASE OF GROUP 4 AND IN
A0112                                          OCT    40064       CASE OF A RESTART WOULD START JO THE TWO
A0113                                                             THINGS LOCATED IN THE DOUBLE 4.6 RESTART
A0114                                                             LOCATION
A0115                                          TC     PHASCHNG    THIS SETS LONGBASE AND UPON A RESTART
A0116                                          OCT    20135       CAUSES 5.13 TO BE RESTARTED  (SINCE
A0117                                                             LONGBASE WAS SET THIS SINGLE ENTRY
A0118                                                             SHOULD BE A LONGCALL)
A0119                                          TC     PHASCHNG    SINCE BOTH TBASE4 AND LONGBASE ARE SET,
A0120                                          OCT    60124       4.12 SHOULD CONTAIN BOTH A TASK AND A
A0121                                                             LONGCALL TO BE RESTARTED

R0122  TYPE C PHASCHNG CONTAINS THE VARIABLE TYPE OF PHASCHNG INFORMATION.  INSTEAD OF THE INFORMATION BEING IN A
R0124  PERMANENT FORM, ONE STORES THE DESIRED RESTART INFORMATION IN A VARIABKE LOCATION.  THE BITS ARE AS FOLLOWS,

R0126                  TLO 14D XXX CJW GGG

R0127  WHERE EACH LETTER OR NUMBER STANDS FOR A BIT.  THE G;S STAND FOR THE GROUP, OCTAL 1 - 7.  IF THE RESTART IS TO
R0129  BE BY WAITLIST, W IS SET TO 1, IF IT IS A JOB, J IS SET TO 1, IF IT IS A LONGCALL, C IS SET TO 1, ONLY ONE OF
R0131  THESE THREE BIT S MAY BE SET.  X;S ARE IGNORED  1 MUST BE 1, AND 0 MUST  BE 0.  AGAIN T STANDS FOR THE TBASE,
```

R0133 AND L FOR LONGBASE. THE BITS A AND D ARE CONCERNED WITH THE VARIABLE INFORMATION. IF D IS SET TO 1, A PRIORITY
R0135 OR DELTA TIME WILL BE READ FROM THE NEXT LOCATION AFTER THE OCTAL INFORMATION, IF THIS IS TO BE INDIRECT, THAT
R0137 IS, THE NAME OF A LOCATION CONTAINING THE INFORMATION (DELTA TIME ONLY), THEN THIS IS GIVEN AS THE -GENADR OF
R0139 THAT LOCATION WHICH CONTAINS THE DELTA TIME. IF THE OLD PRIORITY OR DELTA TIME IS TO BE USED, THAT WHICH IS
R0141 ALREADY IN THE VARIABLE STORAGE, THEN D IS SET TO 0. NEXT THE A BIT IS USED. IF IT IS SET TO 0, THE ADDRESS
R0143 THAT WOULD BE RESTARTED DURING A RESTART IS THE NEXT LOCATION AFTER THE PHASE INFORMATION, THAT IS, EITHER
R0145 (TC PHASCHNG) +2 OR +3, DEPENDING ON WHETHER D HAD BEEN SET OR NOT. IF A IS SET TO 1, THEN THE ADDRESS THAT
R0147 WOULD BE RESTARTED IS THE 2CADR THAT IS READ FROM THE NEXT TWO LOCATIONS. EXAMPLES,

```
A0149                          AD      TC      PHASCHNG        THIS WOULD CAUSE LOCATION AD +3 TO BE
A0150                          AD+1    OCT     05023           RESTARTED BY GROUP THREE WITHA PRIORITY
A0151                          AD+2    OCT     23000           OF 23.  NOTE UPON RETURNING IT WOULD
A0152                          AD+3                            ALSO GO TO AD+3

A0153                          AD      TC      PHASCHNG        GROUP  1 WOULD CAUSE CAUSE CALLCALL TO
A0154                          AD+1    OCT     27441           BE STARTED AS A LONGCALL FROM THE TIME
A0155                          AD+2    -GENADR DELTIME         STORED IN LONGBASE (LONGBASE WAS SET) BY
A0156                          AD+3    2CADR   CALLCALL        A DELTATIME STORED IN DELTIME.  THE
A0157                          AD+4                            BBCON OF THE 2CADR SHOULD CONTAIN THE E
A0158                          AD+5                            BANK OF DELTIME. PHASCHNG RETURNS TO
A0159                                                          LOCATION AD+5
```

R0160 TYPE 3 PHASCHNG IS A COMBINATION OF VARIABLE AND FIXED PHASE CHANGES. IT WILL START UP A JOB AS INDICATED
R0162 BELOW AND ALSO START UP ONE FIXED RESTART, THAT IS EITHER AN G,1 OR A G,ODD OR THE FIRST ENTRY OF G,EVEN
R0164 DOUBLE ENTRY. THE BIT INFORMATION IS AS FOLLOWS,

R0165 TL1 DAP PPP PPP GGG

R0166 WHERE EACH LETTER OR NUMBER STANDS FOR A BIT. THE G:S STAND FOR THE GROUP, OCTAL 1 - 7. THE P:S FOR THE FIXED
R0168 PHASE INFORMATION, OCTAL 0 - 127. 1 MUST BE 1. AND AGAIN T STANDS FOR THE TBASE AND L FOR LONGBASE. D THIS
R0170 TIME STANDS ONLY FOR PRIORITY SINCE THIS WILL BE CONSIDERED A JOB, AND IT MUST BE GIVEN DIRECTLY IF GIVEN.
R0172 AGAIN A STANDS FOR THE ADDRESS OF THE LOCATION TO BE RESTARTED, 1 IF THE 2CADR IS GIVEN , OR 0 IF IT IS TO BE
R0174 THE NEXT LOCATION.(THE RETURN LOCATION OF PHASCHNG) EXAMPLES,

```
A0175                          AD      TC      PHASCHNG        TBASE IS SET AND ARESTART CAUSE GROUP 3
A0176                          AD+1    OCT     56043           TO START THE JOB AJOBAJOB WITH PRIORITY
A0177                          AD+2    OCT     31000           31 AND THE FIRST ENTRY OF 3,4SPOT(WE CAN
A0178                          AD+3    2CADR   AJOBAJOB        ASSUME IT IS A TASK SINCE WE SET TBASE3)
A0179                          AD+4                            UPON RETURN FROM PHASCHNG CONTROL WOULD
A0180                          AD+5                            GO TO AD+5

A0181                          AD      TC      PHASCHNG        UPON A RESTART THE LAST DISPLAY WOULD BE
A0182                          AD+1    OCT     10015           RESTARTED AND A JOB WITH THE PREVIOUSLY
A0183                          AD+2                            STORED PRIORITY WOULD BE BEGUN AT AD+2
A0184                                                          BY MEANS OF GROUP 5
```

R0185 SUMMARY OF BITS

R0186 TYPE A TL0 DDP PPP PPP GGG

L PHASE TABLE MAINTENANCE USER'S OWN PAGE NO. 4 53

R0187 TYPE 3 TL1 DAP PPP PPP GGG

R0188 TYPE 3 TL0 IAD XXX CJW GGG

L PHASE TABLE MAINTENANCE USER'S OWN PAGE NO. 5 S3

P0189 2PHSCHNG IS USED WHEN ONE WISHES TO START UP A GROUP OR CHANGE A GROUP WHILE UNDER THE CONTROL OF A DIFFERENT
R0191 GROUP. FOR EXAMPLE, CHANGE THE PHASE OF GROUP 3 WHILE THE PORTION OF THE PROGRAM IS UNDER GROUP 5. ALL 2PHSCHNG
R0193 CALLS ARE MADE IN THE FOLLOWING MANNER,

```
A0194                                          TC      2PHSCHNG
A0195                                          OCT     XXXXX
A0196                                          OCT     YYYYY
```

R0197 WHERE OCT XXXXX MUST BE OF TYPE A AND OCT YYYYY MAY BE OF EITHER TYPE A OR TYPE B OR TYPEC. THERE IS ONE
R0199 DIFFERENCE --- NOTE- IF LONGBASE IS TO BE SET THIS INFORMATION IS GIVEN IN THE OCT YYYYY INFORMATION, IT WILL
R0201 BE DISREGARDED IF GIVEN WITH THE OCT XXXXX INFORMATION. A COUPLE OF EXAMPLES MAY HELP,

```
A0203                                          AD      TC      2PHSCHNG        SET TBASE3 AND IF A RESTART OCCURS START
A0204                                          AD+1    OCT     40083           THE TWO ENTRIES IN 3.8 TABLE LOCATION
A0205                                          AD+2    OCT     05025           THIS IS OF TYPE C, SET THE JOB TO BE
A0206                                          AD+3    OCT     18000           TO BE LOCATION AD+4, WITH A PRIORITY 18.
A0207                                          AD+4                            FOR GROUP 5 PHASE INFORMATION

 0209                           4141  0 0004 0  2PHSCHNG INHINT                  THE ENTRY FOR A DOUBLE PHASE CHANGE
 0210  REF  5 LAST  77         4142  50 002 0           NDX     Q
 0211                           4143  3 0000 1           CA      0
 0212  REF  6 LAST  81         4144  24 002 0           INCR    Q
 0213  REF  1                  4145  54 072 0           TS      TEMPP2

 0214  REF  2 LAST  71         4146  7 7765 0           MASK    OCT7
 0215                           4147  6 0000 1           DOUBLE
 0216  REF  1                  4150  54 071 0           TS      TEMPG2

 0217  REF  2 LAST  81         4151  3 0072 1           CA      TEMPP2
 0218  REF  1                  4152  7 4241 0           MASK    OCT17770        NEED ONLY 1770, BUT WHY GET A NEW CONST.
 0219                           4153  0 0006 1           EXTEND
 0220  REF  1                  4154  7 7750 0           MP      BIT12
 0221  REF  3 LAST  81         4155  56 072 1           XCH     TEMPP2

 0222  REF  1                  4156  7 7745 1           MASK    BIT15
 0223  REF  1                  4157  54 066 0           TS      TEMPSW2         INDICATES WHETHER TO SET TBASE OR NOT

 0224  REF  1                  4160  1 4164 1           TCF     PHASCHNG +3


 0225                           4161  0 0004 0  PHASCHNG INHINT
 0226  REF  3 LAST  72         4162  3 7763 1           CA      ONE             INDICATESWE CAME FROM A PHASCHNG ENTRY
 0227  REF  2 LAST  81         4163  54 066 0           TS      TEMPSW2

 0228  REF  7 LAST  81         4164  50 002 0           NDX     Q
 0229                           4165  3 0000 1           CA      0
 0230  REF  8 LAST  81         4166  24 002 0           INCR    Q
 0231  REF  1                  4167  54 065 0           TS      TEMPSW

 0232                           4170  0 0006 1           EXTEND
```

L PHASE TABLE MAINTENANCE USER'S OWN PAGE NO. 6 S3

```
0233  REF   1                 4171  3 4174 1          DCA    ADRPCHN2      OFF TO SWITCHED BANK
0234                          4172  52 006 0          DTCB

02345 REF   9 LAST  71                    E3          EBANK= LST1
0235                          4173    02634 1  ADRPCHN2 2CADR  PHSCHNG2
C0235 REF   1                 4174    14063 1

0236  REF   1                 4175  22 073 0  DNEORTWO  LXCH   TEMPRBCN
0237  REF   10 LAST  77       4176  22 006 1            LXCH   BBANK
0238  REF   2 LAST   82       4177  22 073 0            LXCH   TEMPBBCN

0239  REF   1                 4200  7 5640 1           MASK   OCT14000      SEE WHAT KIND OF PHASE CHANGE IT IS
0240  REF   15 LAST  74       4201  10 000 0           CCS    A
0241  REF   1                 4202  1 4242 0           TCF    CHECKB        IT IS OF TYPE :B:

0242  REF   1                 4203  3 0062 0           CA     TEMPP
0243  REF   1                 4204  7 7755 0           MASK   BIT7
0244  REF   16 LAST  82       4205  10 000 0           CCS    A             SHALL WE USE THE OLD PRIORITY
0245  REF   1                 4206  1 4226 1           TCF    GETPRIO       NO GET A NEW PRIORITY (OR DELTA T)

0246  REF   1                 4207  50 061 0  OLDPRIO  NDX    TEMPG         USE THE OLD PRIORITY (OR DELTA T)
0247  REF   4 LAST  75        4210  3 1112 1           CA     PHSPRDT1 -2
0248  REF   1                 4211  54 070 1           TS     TEMPPR

0249  REF   2 LAST  82        4212  3 0062 0  CON1     CA     TEMPP         SEE IF A 2CADR IS GIVEN
0250  REF   1                 4213  7 7754 1           MASK   BIT8
0251  REF   17 LAST  82       4214  10 000 0           CCS    A
0252  REF   1                 4215  1 4232 1           TCF    GETNEWNM

0253  REF   9 LAST  81        4216  3 0002 0           CA     Q
0254  REF   1                 4217  54 063 0           TS     TEMPNM
0255  REF   5 LAST  74        4220  3 0006 1           CA     BB
0256  REF   1                 4221  54 064 1           TS     TEMPRB

0257  REF   1                 4222  3 4225 0  TOCON2   CA     CON2ADR       BACK TO SWITCHED BANK
0258  REF   3 LAST  82        4223  22 073 0           LXCH   TEMPRBCN
0259                          4224  52 006 0           DTCB

0260  REF   1                 4225    02722 1  CON2ADR  GENADR CON2

0261  REF   10 LAST  82       4226  50 002 0  GETPRIO  NDX    Q             DON:T CARE IF DIRECT OR INDIRECT
0262                          4227  3 0000 1           CA     0             LEAVE THAT DECISION TO RESTARTS
0263  REF   11 LAST  82       4230  24 002 0           INCR   Q             OBTAIN RETURN ADDRESS
0264  REF   1                 4231  1 4211 0           TCF    CON1 -1

02645                         4232  0 0006 1  GETNEWNM EXTEND
0265  REF   12 LAST  82       4233  5 0002 0           INDEX  Q
0266                          4234  3 0001 0           DCA    0
0267  REF   2 LAST  82        4235  52 064 1           DXCH   TEMPNM
0268  REF   2 LAST  61        4236  3 7762 0           CA     TWO
```

L PHASE TABLE MAINTENANCE USER'S OWN PAGE NO. 7 S3

```
0269   REF  13 LAST  82      4237  26 002 1                ADS     Q          OBTAIN RETURN ADDRESS

0270   REF   1               4240  1 4222 0                 TCF     TOCON2

0271                         4241   17770 1  OCT17770 OCT    17770
0272   REF   2 LAST  71             5640     OCT14000 EQUALS PRIO14
0273   REF   1                     7765     OCT7     EQUALS SEVEN
0274   REF  10 LAST  57             0061     TEMPG    EQUALS ITEMP1
0275   REF  10 LAST  57             0062     TEMPP    EQUALS ITEMP2
0276   REF   6 LAST  57             0063     TEMPNM   EQUALS ITEMP3
0277   REF   5 LAST  57             0064     TEMPBB   EQUALS ITEMP4
0278   REF   5 LAST  57             0065     TEMPSW   EQUALS ITEMP5
0279   REF   5 LAST  57             0066     TEMPSW2  EQUALS ITEMP6
0280   REF   6 LAST  77             0070     TEMPPR   EQUALS RUPTREG1
0281   REF   3 LAST  57             0071     TEMPG2   EQUALS RUPTREG2
0282   REF   5 LAST  57             0072     TEMPP2   EQUALS RUPTREG3

0283   REF   5 LAST  57             0073     TEMPBBCN EQUALS RUPTREG4
0284   REF  11 LAST  82             0006     B3       EQUALS BBANK



0285                                06,2634             BANK    06

02855  REF   3 LAST  73                 E3              EBANK=  PHSNAME1
0286   REF   4 LAST  82      06,2634  22 073 0  PHSCHNG2 LXCH    TEMPBBCN
0287   REF   2 LAST  81      06,2635  3 0065 1          CA      TEMPSW
0288   REF   3 LAST  81      06,2636  7 7765 0          MASK    OCT7
0289                         06,2637  6 0000 1          DOUBLE
0290   REF   2 LAST  82      06,2640  54 061 1          TS      TEMPG

0291   REF   3 LAST  83      06,2641  3 0065 1          CA      TEMPSW
0292   REF   2 LAST  81      06,2642  7 4241 0          MASK    OCT17770
0293                         06,2643  0 0006 1          EXTEND
0294   REF   2 LAST  81      06,2644  7 7750 0          MP      BIT12
0295   REF   3 LAST  82      06,2645  54 062 1          TS      TEMPP

0296   REF   4 LAST  83      06,2646  3 0065 1          CA      TEMPSW
0297   REF   1               06,2647  7 2705 0          MASK    OCT60000
0298   REF   5 LAST  83      06,2650  56 065 1          XCH     TEMPSW
0299   REF   2 LAST  82      06,2651  7 5640 1          MASK    OCT14000
0300   REF  18 LAST  82      06,2652  10 000 0          CCS     A

0301   REF   1               06,2653  1 4175 1          TCF     ONEORTWO

0302   REF   4 LAST  83      06,2654  3 0062 0          CA      TEMPP      START STORING THE PHASE INFORMATION
0303   REF   3 LAST  83      06,2655  50 061 0          NDX     TEMPG
0304   REF   1               06,2656  55,076 0          TS      PHASE1 -2

0305   REF   3 LAST  81      06,2657  10 066 0  BELOW1  CCS     TEMPSW2    IS IT A PHASCHNG OR A 2PHSCHNG
```

L PHASE TABLE MAINTENANCE USER'S OWN PAGE NO. 8 S3 E3

```
0306  REF  1                  06,2660  1 2674 1            TCF   BELOW2        IT;S A PHASCHNG

0307                          06,2661  1 2662 0            TCF   +1            IT;S A 2PHSCHNG
0308  REF  4 LAST  81         06,2662  4 0072 0            CS    TEMPP2
0309  REF  5 LAST  84         06,2663  22 072 1            LXCH  TEMPP2
0310  REF  2 LAST  81         06,2664  50 071 1            NDX   TEMPG2
0311  REF  1                  06,2665  53'076 0            DXCH  -PHASE1 -2

0312  REF  4 LAST  83         06,2666  10 066 0            CCS   TEMPSW2
0313                          06,2667  1 2670 0            NOOP                  CAN;T GET HERE
0314  REF  2 LAST  84         06,2670  1 2674 1            TCF   BELOW2

0315  REF  3 LAST  72         06,2671  4 0025 1            CS    TIME1
0316  REF  3 LAST  84         06,2672  50 071 1            NDX   TEMPG2
0317  REF  2 LAST  72         06,2673  55'111 0            TS    TBASE1 -2

0318  REF  6 LAST  83         06,2674  10 065 0  BELOW2     CCS   TEMPSW        SEE IF WE SHOULD SET TBASE OR LONGBASE
0319  REF  1                  06,2675  1 2710 1            TCF   BELOW3        SET LONGBASE ONLY
0320  REF  1                  06,2676  1 2713 1            TCF   BELOW4        SET NEITHER

0321  REF  4 LAST  84         06,2677  4 0025 1            CS    TIME1         SET TBASE TO BEGIN WITH
0322  REF  4 LAST  83         06,2700  50 061 0            NDX   TEMPG
0323  REF  3 LAST  84         06,2701  55'111 0            TS    TBASE1 -2

0324  REF  7 LAST  84         06,2702  3 0065 1            CA    TEMPSW          SHALL WE NOW SET LONGBASE
0325  REF  1                  06,2703  6 2706 1            AD    BIT14COM
0326  REF  19 LAST 83         06,2704  10 000 0            CCS   A
0327                          06,2705   60000 1  OCT60000  OCT   60000         ***** CANT GET HERE *****
0328                          06,2706   17777 0  BIT14COM  OCT   17777         ***** CANT GET HERE *****
0329  REF  2 LAST  84         06,2707  1 2713 1            TCF   BELOW4        NO WE NEED ONLY SET TBASE

0330                          06,2710  0 0006 1  BELOW3     EXTEND              SET LONGBASE
0331  REF  2 LAST  74         06,2711  3 0025 0            DCA   TIME2
0332  REF  2 LAST  74         06,2712  53'433 0            DXCH  LONGBASE

0333  REF  5 LAST  83         06,2713  4 0062 1  BELOW4     CS    TEMPP           AND STORE THE FINAL PART OF THE PHASE
0334  REF  5 LAST  84         06,2714  50 061 0            NDX   TEMPG
0335  REF  2 LAST  84         06,2715  55'075 0            TS    -PHASE1 -2

0336  REF  14 LAST 83         06,2716  3 0002 0            CA    Q
0337  REF  5 LAST  83         06,2717  22 073 0            LXCH  TEMPRBCN
03375                         06,2720  0 0003 1            RELINT
0338                          06,2721  52 006 0            DTCB
0339  REF  6 LAST  84         06,2722  22 073 0  CON2      LXCH  TEMPRBCN

0340  REF  6 LAST  84         06,2723  3 0062 0            CA    TEMPB
0341  REF  6 LAST  84         06,2724  50 061 0            NDX   TEMPG
0342  REF  2 LAST  83         06,2725  55'076 0            TS    PHASE1 -2

0343  REF  2 LAST  82         06,2726  3 0070 0            CA    TEMPPR
```

L PHASE TABLE MAINTENANCE USER'S OWN PAGE NO. 9 S3 E3

```
0344   REF   7 LAST  84      06,2727  50 061 0            NDX     TEMPG
0345   REF   5 LAST  82      06,2730  55'112 0            TS      PHSPRDT1 -2

0346                         06,2731  0 0006 1            EXTEND
0347   REF   3 LAST  82      06,2732  3 0064 0            DCA     TEMPNM
0348   REF   8 LAST  85      06,2733  50 061 0            NDX     TEMPG
0349   REF   4 LAST  83      06,2734  53'515 0            DXCH    PHSNAME1 -2

0350   REF   1               06,2735  1 2657 0            TCF     BELOW1

03505                                 4242                BLOCK   02
0351   REF   3 LAST  83          4242  7 7750 0  CHECKB    MASK    BIT12     SINCE THIS IS OF TYPE B, THIS BIT SHOULD
0352   REF  20 LAST  84          4243  10 000 0            CCS     A          BE HERE IF WE ARE TO GET A NEW PRIORITY
0353   REF   2 LAST  82          4244  1 4226 1            TCF     GETPRIO   IT IS, SO GET NEW PRIORITY

0354   REF   1                   4245  1 4207 1            TCF     OLDPRIO   IT ISN'T, USE THE OLD PRIORITY
```

L PHASE TABLE MAINTENANCE USER'S OWN PAGE NO. 10 53 E3

P0355 PROGRAM DESCRIPTION: NEWPHASE DATE: 11 NOV 1966
R03565 MOD: 1 ASSEMBLY: SUNBURST REV
R03567 MOD BY: COPPS LOG SECTION: PHASE TABLE MAINTENANCE
R0357 FUNCTIONAL DESCRIPTION:
R03571 NEWPHASE IS THE QUICK WAY TO MAKE A NON VARIABLE PHASE CHANGE. IT INCLUDES THE OPTION OF SETTING
R03573 TBASE OF THE GROUP. IF TBASE IS TO BE SET, -C(TIME1) IS STORED IN THE TBASE TABLE AS FOLLOWS:

R03575 (L-1) TBASE0
R03576 (L) TBASE1 (IF GROUP=1)
R03577 (L+1)
R03578 (L+2) TBASE2 (IF GROUP=2)
R03579 -----
R0358 (L+6) TBASE4 (IF GROUP=4)
R03581 (L+7)
R03582 (L+8) TBASE5 (IF GROUP=5)

R0359 IN ANY CASE, THE NEGATIVE OF THE PHASE, FOLLOWED (IN THE NEXT REGISTER) BY THE PHASE, IS STORED IN THE
R03592 PHASE TABLE AS FOLLOWS:

R03593 (L) -PHASE1 (IF GROUP=1)
R03594 (L+1) PHASE1
R03595 (L+2) -PHASE2 (IF GROUP=2)
R03596 (L+3) PHASE2
R03597 -----
R03598 (L+7) PHASE4
R03599 (L+8) -PHASE5 (IF GROUP=5)
R0360 (L+9) PHASE5

R03601 CALLING SEQUENCE:
R0361 EXAMPLE IS FOR PLACING A PHASE OF FIVE INTO GROUP THREE:

R03615 1) IF TBASE IS NOT TO BE SET:

```
A0362                                   L-1     CA      FIVE
A0363                                   L       TC      NEWPHASE
A0364                                   L+1     OCT     00003
```

R03645 2) IF TBASE IS TO BE SET:

```
A0365                                   L-1     CS      FIVE
A0366                                   L       TC      NEWPHASE
A0367                                   L+1     OCT     00003
```

R0368 SUBROUTINES CALLED: NONE

R03685 NORMAL EXIT MODE: AT L+2 OF CALLING SEQUENCE

R0369 ALARM OR ABORT EXITS: NONE

R03695 OUTPUT: PHASE TABLE AND TBASE TABLE UPDATED

R0370 ERASABLE INITIALIZATION REQ'D: NONE

L PHASE TABLE MAINTENANCE USER'S OWN PAGE NO. 11 S3 E3

R03705 DEBRIS: A,L,TEMPG

R03706 ***WARNING*** THIS PROGRAM IS TO BE PLACED IN FIXED-FIXED AND UNSWITCHED ERASABLE.

```
0371                                        4246          BLOCK  02
0372                                4246    0 0004 0  NEWPHASE INHINT

0373  REF   5 LAST  76            4247    54 001 1          TS     L          SAVE FOR FURTHER USE

0374  REF  15 LAST  84            4250    50 002 0          XDX    Q          OBTAIN THE GROUP NUMBER
0375                              4251    3 0000 1          CA     0
0376  REF  16 LAST  87            4252    24 002 0          INCR   Q          OBTAIN THE RETURN ADDRESS
0377                              4253    6 0000 1          DOUBLE            SAVE THE GROUP IN A FORM USED FOR
0378  REF   9 LAST  85            4254    54 061 1          TS     TEMPG      INDEXING

0379  REF   6 LAST  87            4255    10 001 1          CCS    L          SEE IF WE ARE TO SET TBASE
0380                              4256    1 4265 0          TCF    +7         NO, THE DELTA T WAS POSITIVE
0381                              4257    1 4265 0          TCF    +6

0382  REF  21 LAST  85            4260    24 000 1  NJFAZ+10 INCR   A          SET TBASE AND STORE PHASE CORRECTLY
0383  REF   7 LAST  87            4261    54 001 1          TS     L

0384  REF   5 LAST  84            4262    4 0025 1          CS     TIME1      SET TBASE
0385  REF  10 LAST  87            4263    50 061 0          XDX    TEMPG
0386  REF   4 LAST  84            4264    55'111 0          TS     TBASE1 -2

0387  REF   8 LAST  87            4265    4 0001 1          CS     L          NOW PUT THE PHASE IN THE RIGHT TABLE LOC
0388  REF  11 LAST  87            4266    50 061 0          XDX    TEMPG
0389  REF   3 LAST  84            4267    53'076 0          DXCH   -PHASE1 -2

03895                             4270    0 0003 1          RELINT
0390  REF  17 LAST  87            4271    0 0002 0          TC     Q          NOW RETURN TO CALLER
```

L FRESH START AND RESTART USER'S OWN PAGE NO. 1 S3

```
0010                                    01,2000             BANK    01
0015    REF  10 LAST  82                    E3              EBANK=  LST1

0020                            01,2000  0 0004 0  SLAP1    INHINT                  FRESH START. COMES HERE FROM PINBALL.
0025    REF   1                 01,2001  0 2357 1           TC      STARTSUB        SUBROUTINE DOES MOST OF THE WORK.

0030    REF   1                 01,2002  1 2007 0  STARTSW  TCF     GOON            PATCH FOR SIMULATIONS

0035    REF   1                 01,2003  3 7746 0  STARTSIM CAF     BIT14

0040    REF   3 LAST  71        01,2004  0 5516 0           TC      FINDVAC
0045    REF  11 LAST  83                    E0              EBANK=  ITEMP1
0050                            01,2005    03546 0          2CADR   BEGIN206
C0050   REF   1                 01,2006    72060 1
0055    REF   2 LAST  81        01,2007  3 7745 0  GOON     CAF     BIT15           TURN OFF ALL DSPTAB +11D LAMPS ONLY ON
0060    REF   1                 01,2010  54 326 1           TS      DSPTAB +11D     REQUESTED FRESH START.

0065    REF   2 LAST  72        01,2011  4 7767 1           CS      ZERO
0066    REF   2 LAST  76        01,2012  55'127 0           TS      RSTRTWRD
0067    REF   1                 01,2013  54 055 0           TS      THRJST          INITIALIZE THROTTLE COUNTER.
0068    REF   2 LAST  70        01,2014  55'345 0           TS      DAPOFFDT        OVERWRITE IN ERASABLE LOAD IF DESIRED.
0070    REF   1                 01,2015  55'162 1           TS      JETRESET        PROPERTY OF RCSMONIT.

0075    REF   1                 01,2016  3 5661 0           CA      EBANK5
0080    REF   9 LAST  87        01,2017  54 001 1           TS      L
0085    REF   1                 01,2020  22 003 1           LXCH    EBANK
0090    REF   1                             E5              EBANK=  ABDELV
0095    REF   3 LAST  88        01,2021  3 7767 0           CA      ZERO
0100    REF   2 LAST  88        01,2022  55'534 0           TS      ABDELV          FOR DAP INITIALIZATION
0105    REF   3 LAST  88        01,2023  55'535 1           TS      ABDELV +1
0110    REF  11 LAST  88                    E3              EBANK=  LST1
0115    REF   2 LAST  88        01,2024  22 003 1           LXCH    EBANK

0120    REF   1                 01,2025  55'163 0           TS      THISCH32
0125    REF   1                 01,2026  54 101 0           TS      LMPJFAIL
0130    REF   1                 01,2027  54 102 0           TS      CH5MASK
0135    REF   1                 01,2030  54 103 1           TS      CH6MASK

0145    REF   1                 01,2031  55'356 1           TS      REDOCTR
0150    REF   1                 01,2032  55'360 1           TS      FAILREG
0155    REF   2 LAST  88        01,2033  55'361 0           TS      FAILREG +1
0160    REF   3 LAST  88        01,2034  55'362 0           TS      FAILREG +2

0180    REF   3 LAST  82        01,2035  3 7762 0           CA      TWO             SET UP VALUES FOR DVCNTR.  THESE MAY
0185    REF   1                 01,2036  55'337 0           TS      STARTDVC        BE OVERWRITTEN IN ERASABLE LOAD IF
0190    REF   1                 01,2037  55'340 0           TS      STOPDVC         ANYBODY WANTS TO.

0195    REF   1                 01,2040  3 7743 0           CA      POSMAX          TENTATIVELY LOAD WITH INFINITY.  MAY
0200    REF   1                 01,2041  55'336 1           TS      SLOSHCTR        BE REPLACED VIA ERASABLE LOAD.
```

L FRESH START AND RESTART USER'S OWN PAGE NO. 2 S3 E3

```
0220  REF  4 LAST 88   01,2042  4 7767 1  DOFSTART CS    ZERO     MAKE ALL MTIMER/MPHASE PAIRS AVAILABLE.
0225  REF  3 LAST 66   01,2043  55'164 1            TS    MTIMER4
0230  REF  1           01,2044  55'165 0            TS    MTIMER3
0235  REF  1           01,2045  55'166 0            TS    MTIMER2
0240  REF  1           01,2046  55'167 1            TS    MTIMER1
0245  REF  1           01,2047  55'170 1            TS    MPHASE4
0250  REF  1           01,2050  55'171 0            TS    MPHASE3
0255  REF  1           01,2051  55'172 0            TS    MPHASE2
0260  REF  1           01,2052  55'173 1            TS    MPHASE1

0275  REF  4 LAST 81   01,2053  4 7763 0            CS    ONE
0280  REF  1           01,2054  55'145 1            TS    LMPOUTT

R0285 INITIALIZE SWITCH REGISTERS INCLUDING DAP3OOLS:

0290  REF  1           01,2055  3 7761 0            CA    FOUR     INITIALIZE STATE THRU STATE +4 ONLY.
0295  REF 10 LAST 88   01,2056  54 001 1  INITSW     TS    L
0300  REF 11 LAST 89   01,2057  50 001 0            INDEX L
0305  REF  1           01,2060  3 2576 1            CA    SWINIT
0310  REF 12 LAST 89   01,2061  50 001 0            INDEX L
0315  REF  8 LAST 15   01,2062  54 074 0            TS    STATE
0320  REF 13 LAST 89   01,2063  10 001 1            CCS   L
0325  REF  1           01,2064  1 2056 1            TCF   INITSW

0326  REF  1           01,2065  55'355 1            TS    SMODE
0327  REF  1           01,2066  55'353 1            TS    ERESTORE
0330  REF  1           01,2067  55'133 0            TS    LMPCMD   RESET LMP COMMAND AREA.
0335  REF  2 LAST 89   01,2070  55'134 1            TS    LMPCMD +1
0340  REF  3 LAST 89   01,2071  55'135 0            TS    LMPCMD +2
0345  REF  4 LAST 89   01,2072  55'136 0            TS    LMPCMD +3
0350  REF  5 LAST 89   01,2073  55'137 1            TS    LMPCMD +4
0355  REF  6 LAST 89   01,2074  55'140 1            TS    LMPCMD +5
0360  REF  7 LAST 89   01,2075  55'141 0            TS    LMPCMD +6
0365  REF  8 LAST 89   01,2076  55'142 0            TS    LMPCMD +7
0370  REF  1           01,2077  55'143 1            TS    LMPIN
0375  REF  1           01,2100  55'144 0            TS    LMPOUT

0380                   01,2101  0 0006 1            EXTEND   TURN THE RCS JETS OFF.
0385                   01,2102  01 005 0            WRITE  5
0390                   01,2103  0 0006 1            EXTEND
0395                   01,2104  01 006 0            WRITE  6

0400  REF  1           01,2105  3 2570 1            CAF   IM30INIF   FRESH START IMU INITIALIZATION.
0405  REF  1           01,2106  54 365 0            TS    IMODES30

0410  REF  2 LAST 74   01,2107  3 7752 0            CAF   BIT10     REMOVE IMU FAIL INHIBIT IN 5 SECS.
0415  REF  2 LAST 63   01,2110  0 5663 1            TC    WAITLIST
0420  REF 12 LAST 88                 E3            EBANK= LST1
0425                   01,2111   02273 0            2CADR IFAILOK
C0425 REF  1           01,2112   26063 0
```

L FRESH START AND RESTART USER'S OWN PAGE NO. 3 S3 E3

```
0440                          01,2113  0 0006 1          EXTEND
0445  REF  1                  01,2114  3 2606 0          DCA     SETADR          THE SETIDLER PROGRAM ASSURES 1 SECOND
0450  REF  2 LAST  60         01,2115  53,001 0          DXCH    T5ADR           DELAY BEFORE THE DAPIDLER BEGINS.

0451  REF  1                  01,2116  3 4276 0          CAF     LNORMT4
0452  REF  1                  01,2117  54 346 1          TS      T4LOC

0453  REF  1                  01,2120  3 2554 1          CA      LDNTMGO
0454  REF  14 LAST  89        01,2121  54 001 1          TS      L
0455  REF  3 LAST  88         01,2122  22 003 1          LXCH    EBANK

0456  REF  1                             E7             EBANK=  DNTMGOTO

0457  REF  1                  01,2123  3 2553 0          CA      LDNPHAS1
0458  REF  2 LAST  90         01,2124  55,401 1          TS      DNTMGOTO

0459  REF  1                  01,2125  3 2556 0          CA      SETCDULM
0460  REF  1                  01,2126  55,405 0          TS      CDULMIT         OVERWRITE IN ERASABLE LOAD IF DESIRED.

0461  REF  1                  01,2127  3 2557 1          CA      IDNCDUN
0462  REF  1                  01,2130  55,404 1          TS      DNCDUN          OVERWRITE IN ERASABLE LOAD IF DESIRED.

0463  REF  4 LAST  90         01,2131  22 003 1          LXCH    EBANK

0464  REF  13 LAST  89                   E3             EBANK=  TST1

0465  REF  1                  01,2132  0 2151 0          TC      MR.CLEAN        DEACTIVATE ALL RESTART GROUPS.

0466                          01,2133  0 0003 1          RELINT                  LET AN INTERRUPT IN.
0467                          01,2134  1 2135 0          NOOP
0468                          01,2135  0 0004 0          INHINT

0469  REF  1                  01,2136  0 5270 1          TC      IBNKCALL
0470  REF  1                  01,2137   40315 1          CADR    1STENGOF

0472  REF  5 LAST  89         01,2140  3 7767 0  P00H3    CA      ZERO
0475  REF  5 LAST  77         01,2141  54 302 1          TS      MODREG
0480  REF  1                  01,2142  54 764 0          TS      PHASENUM

0482                          01,2143  0 0003 1  ENDRSTRT RELINT
0485  REF  2 LAST  77         01,2144  0 5206 0          TC      BANKCALL        DISPLAY MAJOR MODE.
0490  REF  1                  01,2145   12001 0          CADR    DSPMM

0495  REF  2 LAST  76         01,2146  0 6051 0          TC      FLAGUP          TURN ON RESTARTABILITY FLAG.
0500                          01,2147   04000 0          DCT     4000

0505  REF  3 LAST  63         01,2150  1 5600 0          TCF     DUMMYJOB +2     DONT ZERO NEWJOB
```

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```
0525  REF   1                 01,2151  3 7764 0  MR.CLEAN CAF    ELEVEN     INITIALIZE PHASE TABLE.  DO IT THIS WAY
0530  REF   5 LAST  20        01,2152  54 120 0    +1     TS     BUF        TO MINIMIZE THE TIME OF PHASE TABLE

0535  REF   6 LAST  90        01,2153  4 7767 1           CS     ZERO       DISAGREEMENT.
0540                          01,2154  22 007 0           ZL
0545  REF   6 LAST  91        01,2155  50 120 1           INDEX  BUF
0550  REF   4 LAST  87        01,2156  53'077 1           DXCH   -PHASE1 -1

0555  REF   7 LAST  91        01,2157  10 120 0           CCS    BUF
0560  REF  22 LAST  87        01,2160  10 000 0           CCS    A
0565  REF   2 LAST  90        01,2161  1 2152 1           TCF    MR.CLEAN +1

0570  REF  18 LAST  87        01,2162  0 0002 0           TC     Q
```

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P0600 COMES HERE FROM LOCATION 4000, GOJAM. RESTART ANY PROGRAMS WHICH MAY HAVE BEEN RUNNING AT THE TIME.

```
0610  REF  2 LAST  88    01,2163  25,356 0  GOPROG   INCR    REDOCTR          ANOTHER RESTART.

0611  REF 19 LAST  91    01,2164  22 002 0           XCH     Q
0612  REF  1             01,2165  53,775 1           OXCH    RSBBQ            SAVE BBANK & Q FOR RESTART ANALYSIS.

0615  REF  2 LAST  88    01,2166  0 2357 1           TC      STARTSUB

0620  REF  3 LAST  88    01,2167  3 7745 0           CA      BIT15            TEST THE OSC FAIL BIT TO SEE IF WE HAVE
0622                     01,2170  0 0006 1           EXTEND                   HAD A POWER TRANSIENT.  IF SO, ATTEMPT
0625                     01,2171  03 033 1           MAND    33               A RESTART.  IF NOT, CHECK THE PRESENT
0627                     01,2172  0 0006 1           EXTEND                   STATE OF AGC WARNING.
0630  REF  1             01,2173  1 2201 1           BZF     LIGHTSET

0632  REF  2 LAST  88    01,2174  3 7746 0           CA      BIT14            IF AGC WARNING ON (BIT = 0), DO A FRESH
0635                     01,2175  0 0006 1           EXTEND                   START ON THE ASSUMPTION THAT WE'RE IN A
0637                     01,2176  02 033 0           RAND    33               RESTART LOOP.
0640                     01,2177  0 0006 1           EXTEND
0642  REF  1             01,2200  1 2042 1           BZF     DOFSTART

0645                     01,2201  0 0006 1  LIGHTSET EXTEND                   DONT TRY TO RESTART IF ERROR
0650                     01,2202  00 015 0           READ    15               AND MARK REJECT BUTTONS DEPRESSED.
0655  REF  1             01,2203  6 2565 0           AD      -ELR
0660                     01,2204  0 0006 1           EXTEND
0665                     01,2205  1 2207 1           BZF     +2
0670                     01,2206  1 2215 1           TCF     +7

0675  REF  1             01,2207  3 7757 0           CAF     BIT5
0680                     01,2210  0 0006 1           EXTEND
0685                     01,2211  02 016 1           RAND    16
0690  REF  1             01,2212  6 2566 0           AD      -MKREJ
0695                     01,2213  0 0006 1           EXTEND
0700  REF  2 LAST  92    01,2214  1 2042 1           BZF     DOFSTART

0705  REF  2 LAST  89    01,2215  3 1353 0           CA      ERESTORE         IF SELF-CHECK ERASABLE-MEMORY TEST WAS
0710                     01,2216  0 0006 1           EXTEND                   INTERRUPTED BY A RESTART, DOUBT ERASABLE
0715                     01,2217  1 2221 0           BZF     +2               AND DO A FRESH START.
0720  REF  3 LAST  92    01,2220  1 2042 1           TCF     DOFSTART

0725  REF  1             01,2221  3 2574 0           CA      9,6,4            LEAVE PROG ALARM, GIMBAL LOCK & NO ATT
0730  REF  2 LAST  88    01,2222  7 0326 1           MASK    DSPTAB +11D      LAMPS INTACT ON RESTART.
0735  REF  4 LAST  92    01,2223  6 7745 0           AD      BIT15
0740  REF  3 LAST  92    01,2224  56 326 0           XCH     DSPTAB +11D      IF NO ATT LAMP WAS ON, LEAVE ISS IN
0745  REF  1             01,2225  7 7760 0           MASK    BIT4             COARSE ALIGN.
0750                     01,2226  0 0006 1           EXTEND
0755                     01,2227  05 012 1           MOR     12

0760  REF  1             01,2230  3 2571 0           CAF     IFAILINH         LEAVE IMU FAILURE INHIBITS INTACT ON
0765  REF  2 LAST  89    01,2231  7 0365 0           MASK    IMODES30         RESTART, RESETTING ALL FAILURE CODES.
```

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```
0770  REF  1                01,2232  6 2572 0          AD      IM30INIR      THE RECORD OF THE ISS OPERATE BIT IS
0775  REF  3 LAST  92        01,2233  54 365 0          TS      IMODES30      ALSO LEFT ALONE (206 ONLY).

0780                         01,2234  0 0006 1          EXTEND                SETTING T5RUPT FOR DAPIDLER PROGRAM
0785  REF  1                01,2235  3 2604 1          DCA     IDLEADR
0790  REF  3 LAST  90        01,2236  53,001 0          DXCH    T5ADR

0795  REF  1                01,2237  3 5660 1          CAF     PRIO37        DISPLAY FAILREG AS INDICATION OF RESTART
0800  REF  2 LAST  77        01,2240  0 5505 1          TC      NOVAC         OR TO DISPLAY ABORT CODE AS ABOVE.
0805  REF  14 LAST 90                        E3         EBANK=  LST1
0810                         01,2241    02106 1        2CADR   DOALARM
C0810 REF  1                01,2242    16063 0
0815  REF  2 LAST  90        01,2243  4 0346 1          CS      T4LOC         SEE IF LMP COMMAND WAS SITTING IN CH 10
0820  REF  1                01,2244  6 2561 1          AD      LLMPRS2       WHEN RESTART OCCURRED. IF SO, SET BIT 15
0825                         01,2245  0 0006 1          EXTEND                BACK TO ZERO SO THE COMMAND WILL BE
0830  REF  1                01,2246  1 2255 0          BZF     LMPRUPT       RESENT.

0835  REF  2 LAST  89        01,2247  11,145 1          CCS     LMPOUTT       IF NOT, SEE IF UPDATE OF REFERENCE
0840  REF  5 LAST  89        01,2250  6 7763 1          AD      ONE           POINTER (LMPOUT) WAS IN PROCESS. IF SO,
0845  REF  2 LAST  89        01,2251  55,144 0          TS      LMPOUT        LMPOUTT IS NON-NEGATIVE.
0850  REF  6 LAST  93        01,2252  4 7763 0          CS      ONE           SHOW LMPOUT UPDATED.
0855  REF  3 LAST  93        01,2253  55,145 1          TS      LMPOUTT
0860  REF  1                01,2254  1 2262 1          TCF     T4LOCRST

0865  REF  3 LAST  93        01,2255  51,144 1  LMPRUPT INDEX   LMPOUT
0870  REF  9 LAST  89        01,2256  4 1133 0          CS      LMPCMD
0875  REF  5 LAST  92        01,2257  7 7745 1          MASK    BIT15
0880  REF  4 LAST  93        01,2260  51,144 1          INDEX   LMPOUT
0885  REF  10 LAST 93        01,2261  27,133 0          ADS     LMPCMD

0890  REF  2 LAST  90        01,2262  3 4276 0  T4LOCRST CAF    LNORMT4
0895  REF  3 LAST  93        01,2263  54 346 1          TS      T4LOC

0896  REF  2 LAST  92        01,2264  3 7760 1          CA      BIT4          TURN THROTTLE COUNTER ON.  (IF EMPTY,
0897                         01,2265  0 0006 1          EXTEND                NO HARM DONE.  IF NON-EMPTY, ASSUME
0898                         01,2266  05 014 1          NOR     14            CONTENTS ARE VALID.)

0900  REF  4 LAST  85        01,2267  3 7750 1          CAF     BIT12         TEST THE RESTARTABILITY FLAG.
0905  REF  1                01,2270  7 0075 1          MASK    FLAGWRD1
0910  REF  23 LAST 91        01,2271  10 000 0          CCS     A
0915                         01,2272  1 2275 1          TCF     +3            RESTARTABLE.
0920  REF  1                01,2273  0 5225 1          TC      POSTJUMP      NOT RESTARTABLE.  DO A FAKESTART.
0925  REF  1                01,2274    16000 0        CADR    FAKESTRT

0930                         01,2275  0 0003 1  GOPROG2 RELINT
0935                         01,2276  1 2277 0          NOOP                  LET AN INTERRUPT IN
0940                         01,2277  0 0004 0          INHINT

0945  REF  1                01,2300  3 7766 1          CAF     NUMGOPS       VERIFY PHASE TABLE AGREEMENT.
0950  REF  25 LAST 76        01,2301  54 151 0  PCLOOP  TS      MPAC +5
```

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```
0955                          01,2302  6 0000 1          DOUBLE
0960                          01,2303  0 0006 1          EXTEND
0965  REF  24 LAST  93        01,2304  5 0000 1          INDEX  A
0970  REF   5 LAST  91        01,2305  3 1100 1          DCA    -PHASE1      COMPLEMENT INTO A, DIRECT INTO L.
0975                          01,2306  0 0006 1          EXTEND
0980  REF  15 LAST  90        01,2307  06 001 0          RXOR   L            RESULT MUST BE -0 FOR AGREEMENT.
0985  REF  25 LAST  94        01,2310  10 000 0          CCS    A
0990  REF   1                 01,2311  1 2347 1          TCF    PTBAD        RESTART FAILURE.
0995  REF   2 LAST  94        01,2312  1 2347 1          TCF    PTBAD
1000  REF   3 LAST  94        01,2313  1 2347 1          TCF    PTBAD

1005  REF  26 LAST  93        01,2314  10 151 0          CCS    MPAC +5      PROCESS ALL RESTART GROUPS.
1010  REF   1                 01,2315  1 2301 0          TCF    PCLOOP

1015  REF  27 LAST  94        01,2316  54 152 0          TS     MPAC +6      SET TO +0.

1020  REF   2 LAST  93        01,2317  3 7766 1          CAF    NJMGRPS      SEE IF ANY GROUPS RUNNING.
1025  REF  28 LAST  94        01,2320  54 151 0  NXTRST  TS     MPAC +5
1030                          01,2321  6 0000 1          DOUBLE
1035  REF  26 LAST  94        01,2322  50 000 1          INDEX  A
1040  REF   3 LAST  84        01,2323  11'100 0          CCS    PHASE1
1045  REF   1                 01,2324  1 2326 0          TCF    PACTIVE      PNZ = GROUP ACTIVE.
1050  REF   1                 01,2325  1 2333 1          TCF    PINACT       +0 = GROUP NOT RUNNING.

1055  REF  29 LAST  94        01,2326  54 144 1  PACTIVE  TS     MPAC
1060  REF  30 LAST  94        01,2327  24 144 0          INCR   MPAC         ABS OF PHASE.
1065  REF  31 LAST  94        01,2330  24 152 1          INCR   MPAC +6      INDICATE GROUP DEMANDS PRESENT.
1070  REF   1                 01,2331  3 2353 0          CA     RACTCADR     GO TO RESTARTS AND PROCESS PHASE INFO.
1075  REF   1                 01,2332  0 5212 0          TC     SWCALL       MUST RETURN TO SWRETURN.

1080  REF  32 LAST  94        01,2333  10 151 0  PINACT  CCS    MPAC +5      PROCESS ALL RESTART GROUPS.
1085  REF   1                 01,2334  1 2320 0          TCF    NXTRST

1090  REF  33 LAST  94        01,2335  10 152 0          CCS    MPAC +6      SEE IF ANY GROUPS WERE ACTIVE.
1095  REF   1                 01,2336  1 2143 1          TCF    ENDRSTRT     YES, THERE WERE.

1100  REF   1                 01,2337  0 4755 1          TC     ALARM        RESTART WITH NO ACTIVE GROUPS.
1105                          01,2340   01110 0          OCT    1110

1110  REF   2 LAST  93        01,2341  4 0075 1          CS     FLAGWRD1     WAS THE RESTARTABILITY FLAG SET?
1115  REF   5 LAST  93        01,2342  7 7750 0          MASK   BIT15
1120  REF  27 LAST  94        01,2343  10 000 0          CCS    A
1125  REF   1                 01,2344  1 2607 0          TCF    POOH2        NO.
1130  REF   6 LAST  90        01,2345  54 302 1          TS     MODREG       YES.  SET MAJOR MODE TO 00.
1132  REF   2 LAST  94        01,2346  1 2143 1          TCF    ENDRSTRT

1135  REF   2 LAST  94        01,2347  0 4755 1  PTBAD   TC     ALARM        SET ALARM TO SHOW PHASE TABLE FAILURE.
1140                          01,2350   01107 0          OCT    1107

1142                          01,2351  0 0004 0          INHINT
```

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```
1145  REF  4 LAST 92    01,2352  1 2042 1            TCF    DOFSTART

1150  REF  1           01,2353   14377 1  RACTCADR  CADR   RESTARTS

1151                   01,2354   0 0004 0  ENEMA     INHINT              HAVING PRESET PHASE REGISTERS, DO A
1152  REF  1           01,2355   0 2374 0            TC     STARTSB2      PSEUDO-RESTART.  (THE RESTARTABILITY
1153  REF  1           01,2356   1 2275 1            TCF    GOPROG2       FLAG MUST BE SET WHEN ENEMA IS CALLED.)
```

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P1155 INITIALIZATION COMMON TO BOTH FRESH START AND RESTART.

```
1185  REF   7 LAST  91      01,2357  3 7767 0  STARTSJB  CA      ZERO
1190                        01,2360  0 0006 1            EXTEND
1195                        01,2361  01 005 0            WRITE   5              TURN THE RCS JETS OFF.
1200                        01,2362  0 0006 1            EXTEND
1205                        01,2363  01 006 0            WRITE   6

1210                        01,2364  0 0006 1            EXTEND
1215                        01,2365  01 012 0            WRITE   12             TURN OFF TRIM GIMBAL.

1220  REF   2 LAST  88      01,2366  3 7743 0            CA      POSMAX
1225  REF   1               01,2367  54 026 1            TS      TIME3          37777 TO TIME3.
1230  REF   2 LAST  71      01,2370  6 5336 1            AD      MINJS2
1235  REF   1               01,2371  54 027 0            TS      TIME4          37775 TO TIME4.
1240  REF   1               01,2372  6 7771 1            AD      NEGONE
1245  REF   1               01,2373  54 030 0            TS      TIME5          37774 TO TIME5.

1250  REF   8 LAST  96      01,2374  3 7767 0  STARTS32  CAF     ZERO           ENTRY FROM P00 AND FORGETIT.
1255                        01,2375  0 0006 1            EXTEND
1260                        01,2376  01 007 1            WRITE   7              NOTHING IN SUNBURST IS IN BANKS 40 - 43.
1265                        01,2377  0 0006 1            EXTEND
1270                        01,2400  01 011 0            WRITE   11
1275                        01,2401  0 0006 1            EXTEND
1280                        01,2402  01 014 0            WRITE   14

1285  REF   1               01,2403  3 2567 1            CA      TRIMGIMB       TURN OFF ALL BITS BUT TRIM GIMBAL.
1290                        01,2404  0 0006 1            EXTEND
1295                        01,2405  03 012 1            WAND    12

1300  REF   1               01,2406  3 5655 1            CAF     PRIO34         ENABLE INTERRUPTS.
1305                        01,2407  0 0006 1            EXTEND
1310                        01,2410  01 013 1            WRITE   13

1315  REF  15 LAST  93                     E3            EBANK=  LST1

1320  REF   1               01,2411  3 2564 1            CAF     STARTEB
1325  REF   5 LAST  90      01,2412  54 003 0            TS      EBANK          SET FOR E3

1330  REF   1               01,2413  3 7744 1            CAF     NEG1/2         INITIALIZE WAITLIST DELTA-TS.
1335  REF  16 LAST  96      01,2414  55'407 1            TS      LST1 +7
1340  REF  17 LAST  96      01,2415  55'406 0            TS      LST1 +6
1345  REF  18 LAST  96      01,2416  55'405 0            TS      LST1 +5
1350  REF  19 LAST  96      01,2417  55'404 1            TS      LST1 +4
1355  REF  20 LAST  96      01,2420  55'403 0            TS      LST1 +3
1360  REF  21 LAST  96      01,2421  55'402 1            TS      LST1 +2
1365  REF  22 LAST  96      01,2422  55'401 1            TS      LST1 +1
1370  REF  23 LAST  96      01,2423  55'400 0            TS      LST1

1375  REF   1               01,2424  4 5714 1            CS      ENDTASK
```

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```
1380  REF   1                    01,2425  55'410 1        TS      LST2
1385  REF   2 LAST  97           01,2426  55'412 0        TS      LST2 +2
1390  REF   3 LAST  97           01,2427  55'414 0        TS      LST2 +4
1395  REF   4 LAST  97           01,2430  55'416 1        TS      LST2 +6
1400  REF   5 LAST  97           01,2431  55'420 1        TS      LST2 +8D
1405  REF   6 LAST  97           01,2432  55'422 0        TS      LST2 +10D
1410  REF   7 LAST  97           01,2433  55'424 0        TS      LST2 +12D
1415  REF   8 LAST  97           01,2434  55'426 1        TS      LST2 +14D
1420  REF   9 LAST  97           01,2435  55'430 0        TS      LST2 +16D
1425  REF   2 LAST  96           01,2436  4 5715 0        CS      ENDTASK +1
1430  REF  10 LAST  97           01,2437  55'411 0        TS      LST2 +1
1435  REF  11 LAST  97           01,2440  55'413 1        TS      LST2 +3
1440  REF  12 LAST  97           01,2441  55'415 1        TS      LST2 +5
1445  REF  13 LAST  97           01,2442  55'417 0        TS      LST2 +7
1450  REF  14 LAST  97           01,2443  55'421 0        TS      LST2 +9D
1455  REF  15 LAST  97           01,2444  55'423 1        TS      LST2 +11D
1460  REF  16 LAST  97           01,2445  55'425 1        TS      LST2 +13D
1465  REF  17 LAST  97           01,2446  55'427 0        TS      LST2 +15D
1470  REF  18 LAST  97           01,2447  55'431 1        TS      LST2 +17D

1475  REF   9 LAST  96           01,2450  4 7767 1        CS      ZERO            MAKE ALL EXECUTIVE REGISTER SETS
1480  REF   1                    01,2451  54 157 0        TS      PRIORITY        AVAILABLE.
1485  REF   2 LAST  97           01,2452  54 173 0        TS      PRIORITY +12D
1490  REF   3 LAST  97           01,2453  54 207 0        TS      PRIORITY +24D
1495  REF   4 LAST  97           01,2454  54 223 0        TS      PRIORITY +36D
1500  REF   5 LAST  97           01,2455  54 237 0        TS      PRIORITY +48D
1505  REF   6 LAST  97           01,2456  54 253 1        TS      PRIORITY +60D
1510  REF   7 LAST  97           01,2457  54 267 0        TS      PRIORITY +72D

1515  REF   1                    01,2460  54 067 1        TS      NEWJOB          SHOWS NO ACTIVE JOBS.

1520  REF   1                    01,2461  3 2562 1        CAF     VAC1ADRC        MAKE ALL VAC AREAS AVAILABLE.
1525  REF   1                    01,2462  54 430 1        TS      VAC1USE
1530  REF   1                    01,2463  6 2563 0        AD      LTHVACA
1535  REF   1                    01,2464  54 504 1        TS      VAC2USE
1540  REF   2 LAST  97           01,2465  6 2563 0        AD      LTHVACA
1545  REF   1                    01,2466  54 560 0        TS      VAC3USE
1550  REF   3 LAST  97           01,2467  6 2563 0        AD      LTHVACA
1555  REF   1                    01,2470  54 634 1        TS      VAC4USE
1560  REF   4 LAST  97           01,2471  6 2563 0        AD      LTHVACA
1565  REF   1                    01,2472  54 710 0        TS      VAC5USE

1570  REF   1                    01,2473  3 4570 1        CAF     TEN             TURN OFF ALL DISPLAY SYSTEM RELAYS.
1575  REF   1                    01,2474  54 350 0        TS      DIDFLG          DISPLAY INERTIAL DATA FLAG.
1580  REF  34 LAST  94           01,2475  54 144 1 DSPOFF TS      MPAC
1585  REF   6 LAST  94           01,2476  4 7750 0        CS      BIT12
1590  REF  35 LAST  97           01,2477  50 144 0        INDEX   MPAC
1595  REF   4 LAST  92           01,2500  54 313 1        TS      DSPTAB
1600  REF  36 LAST  97           01,2501  10 144 1        CCS     MPAC
1605  REF   1                    01,2502  1 2475 1        TCF     DSPOFF
```

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```
1615  REF  1                01,2503  54 045 1        TS      INLINK
1620  REF  1                01,2504  54 345 1        TS      DSPCNT
1625  REF  1                01,2505  54 327 0        TS      CADRSTOR
1630  REF  1                01,2506  54 304 1        TS      REQRET
1635  REF  1                01,2507  54 306 0        TS      CLPASS
1640  REF  1                01,2510  54 303 0        TS      DSPLOCK
1645  REF  1                01,2511  54 311 0        TS      MONSAVE         KILL MONITOR
1650  REF  1                01,2512  54 312 0        TS      MONSAVE1
1655  REF  1                01,2513  54 330 0        TS      GRABLOCK
1660  REF  1                01,2514  54 272 1        TS      VERBREG
1665  REF  1                01,2515  54 273 0        TS      NOUNREG
1670  REF  1                01,2516  54 333 0        TS      DSPLIST
1675  REF  2 LAST  98       01,2517  54 334 1        TS      DSPLIST +1
1680  REF  3 LAST  98       01,2520  54 335 0        TS      DSPLIST +2

1685  REF  1                01,2521  54 373 1        TS      MARKSTAT
1690  REF  1                01,2522  54 336 0        TS      EXTVRACT        MAKE EXTENDED VERBS AVAILABLE
1695  REF  1                01,2523  54 367 1        TS      IMUCADR
1700  REF  1                01,2524  54 370 1        TS      OPTCADR
1705  REF  1                01,2525  54 371 0        TS      RADCADR
1710  REF  1                01,2526  54 372 0        TS      ATTCADR
1720  REF  1                01,2527  54 356 0        TS      LGYRO
1725  REF  1                01,2530  54 347 0        TS      DSRUPTSW
1730  REF  1                01,2531  3 7764 0        CAF     NOUTCON
1735  REF  1                01,2532  54 307 1        TS      NOUT

1740  REF  7 LAST  93       01,2533  4 7763 0        CS      ONE             NO RADAR DESIGNATION.
1745  REF  1                01,2534  54 413 0        TS      SAMPLIM         NO RADAR RUPTS EXPECTED.

1750  REF  1                01,2535  3 2573 1        CAF     IM33INIT        NO PIP OR TM FAILS.
1755  REF  1                01,2536  54 366 0        TS      IMODES33

1760  REF  1                01,2537  3 7756 1        CAF     BIT6            SET LR POS.
1765                        01,2540  0 0006 1        EXTEND
1770                        01,2541  02 033 0        RAND    33
1775  REF  1                01,2542  6 2575 1        AD      RMODINIT
1780  REF  2 LAST  61       01,2543  54 412 1        TS      RADMODES

1785  REF  1                01,2544  3 2560 0        CAF     LESCHK          SELF CHECK GO-TO REGISTER.
1790  REF  1                01,2545  55,354 0        TS      SELFRET

1795  REF  1                01,2546  4 4565 1        CS      VD1
1800  REF  1                01,2547  54 270 0        TS      DSPCOUNT

1805  REF  1                01,2550  3 2555 0        CAF     NOMTMLST        SET UP NOMINAL DOWNLINK LIST.
1810  REF  1                01,2551  54 411 1        TS      DNLSTADR

1815  REF  20 LAST  92      01,2552  0 0002 0        TC      Q

1820  REF  1                01,2553   02006 0  DNPHAS1 GENADR DNPHASE1
```

L FRESH START AND RESTART USER'S OWN PAGE NO. 12 53 E3

```
 1825  REF   3 LAST  90      01,2554  03401 1  LDNTMGO  ECADR   DNTMGOTO
 1830  REF   1               01,2555  02236 1  NOMTMLST GENADR  NOMDNLST
 1832                        01,2556  01616 1  SETCDULM DEC     0.05555555      10 DEGREES, SCALED IN HALF-REVS.
 1833                        01,2557  00306 1  IDNCDUN  DEC     198             199 CDU SAMPLES + ONE ID = 4 SECS.
 1835  REF   1               01,2560  02115 0  LESCHK   GENADR  SELFCHK
 1840  REF   1               01,2561  02013 1  LLMPRS2  GENADR  LMPRESET
 1845  REF   2 LAST  97      01,2562  00430 0  VAC1ADRC ADRES   VAC1USE
 1850                        01,2563  00054 0  LTHVACA  DEC     44
 1855  REF  24 LAST  96      01,2564  01400 1  STARTE3  ECADR   LST1
 1860  REF   1                        7766  NUMGRPS  EQUALS  FIVE            SIX GROUPS CURRENTLY.
 1865                        01,2565  77755 0  -ELR     OCT     -22             -ERROR LIGHT RESET KEY CODE.
 1870                        01,2566  77757 1  -MKREJ   OCT     -20             - MARK REJECT.
 1875                        01,2567  07400 1  TRIMGIMB OCT     07400           TRIM GIMBAL DRIVE BITS IN CHANNEL 12.
 1880                        01,2570  37411 1  IM30INIF OCT     37411           INHIBITS IMU FAIL FOR 5 SEC AND PIP ISSW
 1885                        01,2571  00435 0  IFAILINH OCT     435             ISS OPERATE, & FAILURE INHIBIT BITS.
 1890                        01,2572  37000 0  IM30INIR OCT     37000           LEAVE FAIL INHIBITS & OPERATE ALONE.
 1895                        01,2573  16000 0  IM33INIT OCT     16000           NO PIP OR TM FAIL SIGNALS.
 1900                        01,2574  00450 0  9,6,4     OCT     450
 1905                        01,2575  00102 1  RMODINIT OCT     00102

 1910                        01,2576  00000 1  SWINIT   OCT     0
 1915                        01,2577  00000 1          OCT     0
 1920                        01,2600  00005 1          OCT     00005
 1925                        01,2601  40512 0  DAPINIT  OCT     40512           DB SET IN SETIDLE
 1930                        01,2602  00000 1          OCT     0

 1935  REF   1                      E6                EBANK=  DT
 1940                        01,2603  02037 1  IDLEADR  2CADR   DAPIDLER
C1940  REF   1               01,2604  34066 0
 1945  REF   2 LAST  99             E6                EBANK=  DT
 1950                        01,2605  03606 1  SETADR   2CADR   SETIDLE
C1950  REF   1               01,2606  34066 0
```

L FRESH START AND RESTART USER'S OWN PAGE NO. 13 S3 E3

P1955 PROGRAM TO REVERT TO IDLING MODE (P 00).

R1960 CALLING SEQUENCE: TC (OR TCF) POOH UNDER EXEC (NOT INTERRUPTED).

```
 1965                                    4272            BLOCK   2

 1970  REF   2 LAST  93        4272  0 5225 1  POOH      TC      POSTJUMP
 1975  REF   2 LAST  94        4273  02607 1             CADR    POOH2          DO A PARTIAL FRESH START.


 1980                                  01,2607           BANK    01

 1985                        01,2607   0 0004 0  POOH2     INHINT
 1990  REF   2 LAST  95      01,2610   0 2374 0            TC      STARTSB2

 1995  REF   2 LAST  90      01,2611   0 5270 1            TC      IBNKCALL
 2000  REF   1               01,2612   40114 1             CADR    STOPRATE

 2005  REF   3 LAST 100      01,2613   0 5270 1            TC      IBNKCALL
 2010  REF   1               01,2614   40054 1             CADR    SETMAXDB

 2015  REF   2 LAST  76      01,2615   0 6067 0            TC      FLAG1DWN       FOR A MOMENT, INDICATE NON-RESTART-
 2020                        01,2616   04000 0             OCT     4000           ABILITY, SO A RESTART HERE WILL DO POOH.

 2025  REF   1               01,2617   0 6076 0            TC      FLAG2DWN
 2030                        01,2620   00020 0             OCT     20             TURN OFF MISSION TIMER FLAG.

 2035                        01,2621   0 0004 0            INHINT
 2040  REF   3 LAST  91      01,2622   0 2151 0            TC      MR.CLEAN       DEACTIVATE ALL RESTART GROUPS.

 2045  REF   1               01,2623   3 2625 1            CA      LPOOH3         PICK UP RETURN FOR MSTART.
 2050  REF   1               01,2624   0 5161 1            TC      MSTART -1      START MISSION TIMERS COUNTING.
A2055                                                                             WE GET A RELINT AT MSTART.


 2060  REF   1               01,2625   02140 0  LPOOH3     ADRES   POOH3
```

L FRESH START AND RESTART USER'S OWN PAGE NO. 14 S3 E3

P2065 FAKESTRT IS ENTERED FROM GOPROG WHEN A RESTART OCCURS AND THE RESTARTABILITY FLAG IS OFF.

```
2075                                    07,2000             BANK    7
2080  REF  3 LAST  94     07,2000  0 4755 1  FAKESTRT TC     ALARM
2085                      07,2001   00316 0              OCT    0316          FAKESTRT ALARM

2090  REF  1              07,2002  1 2014 1              TCF    FORGET2
```

R2095 FORGETIT IS ENTERED FROM:
R2100 1) FAKESTRT (VIA FORGET2).
R2105 2) VERB 74 UPLINK COMMAND.
R2110 3) ILLEGAL MISSION PHASE COMES DUE IN MISSION SCHEDULING ROUTINE.
R2120 4) ENGINE FAILURE, ETC.
R2125

```
2130                      07,2003  0 0004 0  DOV74    INHINT
2131  REF  4 LAST 100     07,2004  0 5270 1           TC     IBNKCALL
2132  REF  3 LAST 100     07,2005   02374 0           CADR   STARTSB2

2133  REF  2 LAST 101     07,2006  1 2014 1           TCF    FORGET2       BYPASS THE PROGRAM ALARM & 315 DISPLAY.

2135                      07,2007  0 0004 0  FORGETIT INHINT
2140  REF  5 LAST 101     07,2010  0 5270 1           TC     IBNKCALL
2145  REF  4 LAST 101     07,2011   02374 0           CADR   STARTSB2

2150  REF  4 LAST 101     07,2012  0 4755 1           TC     ALARM
2155                      07,2013   00315 0           OCT    315           UNIQUE ALARM FOR FORGETIT.

2160  REF  3 LAST 100     07,2014  0 6067 0  FORGET2  TC     FLAG1DWN      ENTRY FROM FAKESTRT.
2165                      07,2015   04000 0           OCT    04000         KNOCK DOWN RESTART FLAG TO PERMIT POOH.

2170                      07,2016  0 0004 0           INHINT
2175                      07,2017  0 0006 1           EXTEND
2180  REF  1              07,2020  3 2102 0           DCA    KILLCAD
2185  REF  1              07,2021  53'075 0           DXCH   DVMNEXIT

2190                      07,2022  0 0006 1           EXTEND
2195  REF  1              07,2023  3 2100 1           DCA    CADAVER
2200  REF  4 LAST  67     07,2024  53'073 0           DXCH   AVGEXIT

2205  REF  1              07,2025  3 2076 1           CAF    PINGSMON
2207  REF  1              07,2026  55'346 0           TS     OLDDVSEL
2210  REF  1              07,2027  55'310 0           TS     DVSELECT

2215  REF  6 LAST 101     07,2030  0 5270 1           TC     IBNKCALL
2220  REF  1              07,2031   40263 1           CADR   ENGINOFF

2225  REF  7 LAST 101     07,2032  0 5270 1           TC     IBNKCALL
2230  REF  2 LAST 100     07,2033   40114 1           CADR   STOPRATE
```

L FRESH START AND RESTART USER'S OWN PAGE NO. 15 S3 E3

```
2232  REF   8 LAST 101     07,2034  0 5270 1          TC     IBNKCALL
2233  REF   1              07,2035   40066 0          CADR   NOJLIAGE

2235  REF   9 LAST 102     07,2036  0 5270 1          TC     IBNKCALL
2240  REF   2 LAST 100     07,2037   40054 1          CADR   SETMAXDB

2245  REF   1              07,2040  4 2075 0          CS     BGIMBALS      TURN OFF TRIM GIMBALS
2250                       07,2041  0 0006 1          EXTEND
2255                       07,2042  03 012 1          WAND   12

2280  REF  10 LAST  97     07,2043  4 7767 1          CS     ZERO          MAKE ALL RESTART PHASES INACTIVE EXCEPT
2285                       07,2044  22 007 0          ZL                   SERVICER AND STATE VECTOR COPY.
2290  REF   1              07,2045  53,102 1          DXCH   -PHASE2
2295  REF  11 LAST 102     07,2046  4 7767 1          CS     ZERO
2300                       07,2047  22 007 0          ZL
2305  REF   1              07,2050  53,104 1          DXCH   -PHASE3
2310  REF  12 LAST 102     07,2051  4 7767 1          CS     ZERO
2315                       07,2052  22 007 0          ZL
2320  REF   1              07,2053  53,106 0          DXCH   -PHASE4
2321  REF  13 LAST 102     07,2054  4 7767 1          CS     ZERO
2323                       07,2055  22 007 0          ZL
2325  REF   1              07,2056  53,112 0          DXCH   -PHASE6

2328  REF  14 LAST 102     07,2057  4 7767 1          CS     ZERO
2330  REF   2 LAST  89     07,2060  55,173 1          TS     MPHASE1       SET TIMER/PHASE PAIRS TO IDLE STATE
2335  REF   2 LAST  89     07,2061  55,172 0          TS     MPHASE2
2340  REF   2 LAST  89     07,2062  55,171 0          TS     MPHASE3
2345  REF   2 LAST  89     07,2063  55,170 1          TS     MPHASE4
2350  REF   4 LAST  89     07,2064  55,164 1          TS     MTIMER4
2355  REF   2 LAST  89     07,2065  55,165 0          TS     MTIMER3
2360  REF   2 LAST  89     07,2066  55,166 0          TS     MTIMER2
2365  REF   2 LAST  89     07,2067  55,167 1          TS     MTIMER1

2390  REF   3 LAST 100     07,2070  0 5225 1          TC     POSTJUMP
2395  REF   2 LAST  95     07,2071   02275 0          CADR   GOPROG2


2400  REF   4 LAST 101     07,2072  0 6067 0 AVEGKILL TC     FLAG1DWN      COMES HERE WHEN ENGINE OFF
2405                       07,2073   00041 1          OCT    00041         KNOCK DOWN POOH FLAG AND AVERAGEG FLAG

2420  REF   3 LAST  77     07,2074  1 5567 1          TCF    ENDOFJOB


2440                       07,2075   07400 1 BGIMBALS OCT    7400

2445  REF   1              07,2076   02237 0 PINGSMON GENADR PGNCSMON
2450  REF  25 LAST  99                 E3             EBANK= LST1
2455                       07,2077   02324 0 CADAVER  2CADR  SERVEXIT
C2455 REF   1              07,2100   60063 1
```

L FRESH START AND RESTART USER'S OWN PAGE NO. 16 S3 E3

```
 2460   REF  26 LAST 102                    E3          EBANK= LST1
 2465                          07,2101   02072 0  KILLCAD  2CADR  AVEGWILL
C2465   REF   1               07,2102   16063 0
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 1 S3

```
0001                                    12,2000          BANK   12
0002  REF   2 LAST  61                      E6           EBANK= M11
0003  REF   1                 12,2000  54 016 1  T4RUPT  TS     BANKRUPT

0004  REF  15 LAST 102         12,2001  3 7767 0         CA     ZERO
0005                           12,2002  0 0006 1         EXTEND                 ZERO OUTO EVERY T4RUPT.
0006  REF   1                 12,2003  01 010 1         WRITE  OUTO

0007  REF   4 LAST  93         12,2004  50 346 0         INDEX  T4LOC           NORMALLY TO NORMT4, BUT TO LMPRESET OR
0008                           12,2005  1 0000 0         TCF    0               DSKYRSET AFTER OUTO COMMAND.

0009  REF   2 LAST  98         12,2006  10 347 0 NORMT4  CCS    DSRUPTSW        GOES 7(-1)0.
0010                           12,2007  1 2011 1         TCF    +2
0011  REF   2 LAST  83         12,2010  3 7765 1         CAF    SEVEN
0012  REF   3 LAST 104         12,2011  54 347 0         TS     DSRUPTSW

0013  REF   2 LAST  61         12,2012  1 2030 1         TCF    T4RUPTA

0014  REF   3 LAST  93         12,2013  3 4276 0 LMPRESET CAF   LNORMT4         DO THINGS IN THIS ORDER FOR RESTART
0015  REF   5 LAST 104         12,2014  54 346 1         TS     T4LOC           PROTECTION.
0016  REF   4 LAST  93         12,2015  3 1145 0         CA     LMPOUTT         NEW VALUE OF OUTPUT POINTER.
0017  REF   5 LAST  93         12,2016  55,144 0         TS     LMPOUT
0018  REF   8 LAST  98         12,2017  4 7763 0         CS     ONE             TO SHOW OUTPUT POINTER ALREADY UPDATED.
0019  REF   5 LAST 104         12,2020  55,145 1         TS     LMPOUTT
0020  REF   1                 12,2021  3 4274 1         CAF    90MRUPT
0021                           12,2022  1 2026 0         TCF    +4

0022  REF   4 LAST 104         12,2023  3 4276 0 DSKYRSET CAF   LNORMT4         20 MS ON / 100 MS OFF.
0023  REF   6 LAST 104         12,2024  54 346 1         TS     T4LOC
0024  REF   1                 12,2025  3 4275 0         CAF    100MRUPT
0025  REF   2 LAST  96         12,2026  54 027 0   +4    TS     TIME4
0026  REF   2 LAST  61         12,2027  1 5735 1         TCF    NOQRSM
0027                                       4274         BLOCK  02
0028                              4274  37767 0 90MRUPT  DEC    16375
0029                              4275  37766 1 100MRUPT DEC    16374
0030  REF   1                    4276  02006 0 LNORMT4  ADRES  NORMT4
0031                              4277  74000 1 74K      OCT    74000

R0032 RELTAB IS A PACKED TABLE. RELAYWORD CODE IN UPPER 4 BITS. RELAY CODE
R0033 IN LOWER 5 BITS.

0034                              4300  04025 1 RELTAB   OCT    04025
0035                              4301  10003 0          OCT    10003
0036                              4302  14031 0          OCT    14031
0037                              4303  20033 0          OCT    20033
0038                              4304  24017 1          OCT    24017
0039                              4305  30036 1          OCT    30036
0040                              4306  34034 1          OCT    34034
0041                              4307  40023 1          OCT    40023
0042                              4310  44035 1          OCT    44035
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 2 S3 E6

```
0043                    4311   50037 0          OCT    50037
0044                    4312   54000 0          OCT    54000
0045                    4313   60000 1  RELTAB11 OCT    60000
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 3 S3 E6

P0046 SWITCHED-BANK PORTION.

```
0047                                    12,2030                 BANK    12
0048                            12,2030 0 0006 1  T4RUPTA       EXTEND
0049  REF   1                   12,2031 22 012 1                QXCH    QRUPT

0050  REF   6 LAST 104          12,2032 51'144 1                INDEX   LMPOUT       SEE IF LMP COMMAND TO BE PUT OUT.
0051  REF  11 LAST  93          12,2033 11'133 0                CCS     LMPCMD
0052  REF   1                   12,2034 1 2056 1                TCF     CDRVE        BIT 15 = 1 AND (UP TO) BITS 1 - 11
0053  REF   2 LAST 106          12,2035 1 2056 1                TCF     CDRVE        CONTAIN THE COMMAND.

0054  REF   1                   12,2036 3 2147 1                CAF     LLMPRS       SET T4 FOR SPECIAL RUPT AND SHOW LMP
0055  REF   7 LAST 104          12,2037 54 346 1                TS      T4LOC        COMMAND IN PROGRESS IF RESTART.

0056  REF   1                   12,2040 3 4563 0                CAF     LOW11
0057  REF   7 LAST 106          12,2041 51'144 1                INDEX   LMPOUT
0058  REF  12 LAST 106          12,2042 7 1133 0                MASK    LMPCMD       LEAVE COMMAND PORTION INTACT.
0059  REF   8 LAST 106          12,2043 51'144 1                INDEX   LMPOUT
0060  REF  13 LAST 106          12,2044 55'133 0                TS      LMPCMD
0061  REF   1                   12,2045 6 4277 1                AD      74K
0062                            12,2046 0 0006 1                EXTEND
0063  REF   2 LAST 104          12,2047 01 010 1                WRITE   OUTO

0064  REF   9 LAST 106          12,2050 11'144 0                CCS     LMPOUT       PREDICT NEW VALUE OF LMPOUT BUT DONT
0065                            12,2051 1 2053 1                TCF     +2           UPDATE IT UNTIL COMMAND SENT (IN CASE OF
0066  REF   3 LAST 104          12,2052 3 7765 1                CAF     SEVEN        RESTART.)
0067  REF   6 LAST 104          12,2053 55'145 1                TS      LMPOUTT

0068  REF   1                   12,2054 3 2150 1                CAF     30MRUPT
0069  REF   1                   12,2055 1 2133 0                TCF     SETTIME4

0070  REF   5 LAST  97          12,2056 10 326 1  CDRVE         CCS     DSPTAB +11D
0071  REF   1                   12,2057 0 2066 0                TC      DSPOUT
0072  REF   2 LAST 106          12,2060 0 2066 0                TC      DSPOUT

0073  REF   6 LAST 106          12,2061 56 326 0                XCH     DSPTAB +11D
0074  REF   2 LAST 106          12,2062 7 4563 1                MASK    LOW11
0075  REF   7 LAST 106          12,2063 54 326 1                TS      DSPTAB +11D
0076  REF   1                   12,2064 6 4313 1                AD      RELTAB11
0077  REF   1                   12,2065 0 2126 0                TC      DSPLAYC
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 4 S3 E6

P0078 DSPOJT PROGRAM. PUTS OUT DISPLAYS.

```
0079  REF  2 LAST  98   12,2066  10 307 1  DSPOUT   CCS   NOJT        DRIVE DISPLAY SYSTEM RELAYS.
0080                    12,2067  1 2072 1           TCF   +3

0081  REF  1            12,2070  3 2107 0  NODSPOJT CAF   120MRUPT   SET FOR RUPT IN 120 MS IF NO RELAYS.
0082  REF  2 LAST 106   12,2071  1 2133 0           TCF   SETTIME4

0083  REF  3 LAST 107   12,2072  54 307 1           TS    NOJT
0084  REF 16 LAST 104   12,2073  4 7767 1           CS    ZERO
0085  REF  1            12,2074  54 073 1           TS    DSRUPTEM   SET TO -0 FOR 1ST PASS THRU DSPTAB
0086  REF  2 LAST  98   12,2075  56 345 0           XCH   DSPCNT
0087  REF  1            12,2076  6 7770 0           AD    NEGO       TO PREVENT +0
0088  REF  3 LAST 107   12,2077  54 345 1           TS    DSPCNT
0089  REF  4 LAST 107   12,2100  50 345 0  DSPSCAN   INDEX DSPCNT
0090  REF  8 LAST 106   12,2101  10 313 1           CCS   DSPTAB
0091  REF  5 LAST 107   12,2102  10 345 1           CCS   DSPCNT     IF DSPTAB ENTRY +, SKIP
0092  REF  1            12,2103  0 2076 1           TC    DSPSCAN -2 IF DSPCNT +, AGAIN
0093  REF  1            12,2104  0 2115 0           TC    DSPLAY     IF DSPTAB ENTRY -, DISPLAY
0094                    12,2105   00012 1  TABLNTH  OCT   12         DEC 10   LENGTH OF DSPTAB
0095  REF  2 LAST 107   12,2106  10 073 1           CCS   DSRUPTEM   IF DSRUPTEM=+0,2ND PASS THRU DSPTAB
0096                    12,2107   37764 0  120MRUPT DEC   16372      (DSPCNT = 0), +0 INTO NOUT.
0097  REF  4 LAST 107   12,2110  54 307 1           TS    NOJT
0098  REF  1            12,2111  1 2070 0           TCF   NODSPOUT
0099  REF  3 LAST 107   12,2112  54 073 1           TS    DSRUPTEM   IF DSRUPTEM=-0,1ST PASS THRU DSPTAB
0100  REF  1            12,2113  3 2105 1           CAF   TABLNTH    (DSPCNT=0), +0 INTO DSRUPTEM, PASS AGAIN
0101  REF  2 LAST 107   12,2114  0 2077 0           TC    DSPSCAN -1

0102  REF  9 LAST 104   12,2115  6 7763 1  DSPLAY   AD    ONE
0103  REF  6 LAST 107   12,2116  50 345 0           INDEX DSPCNT
0104  REF  9 LAST 107   12,2117  54 313 1           TS    DSPTAB     REPLACE POSITIVELY
0105  REF  3 LAST 106   12,2120  7 4563 1           MASK  LOW12      REMOVE BITS 12 TO 15
0106  REF  4 LAST 107   12,2121  54 073 1           TS    DSRUPTEM
0107  REF  1            12,2122  3 4560 0           CAF   HI5
0108  REF  7 LAST 107   12,2123  50 345 0           INDEX DSPCNT
0109  REF  1            12,2124  7 4300 1           MASK  RELTAB     PICK UP BITS 12 TO 15 OF RELTAB ENTRY
0110  REF  5 LAST 107   12,2125  6 0073 0           AD    DSRUPTEM
0111                    12,2126  0 0006 1  DSPLAYC  EXTEND
0112  REF  3 LAST 106   12,2127  01 010 1           WRITE OUT0

0113  REF  1            12,2130  3 2146 0           CAF   LDSCVRS
0114  REF  8 LAST 106   12,2131  54 346 1           TS    T4LOC
0115  REF  1            12,2132  3 2151 0           CAF   20MRUPT

0116  REF  3 LAST 104   12,2133  54 027 0  SETTIME4 TS    TIME4
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 5 S3 E6

P0117 JUMP TO APPROPRIATE ONCE-PER SECOND (.96 SEC ACTUALLY) ACTIVITY

```
0118  REF   4 LAST 104    12,2134  50 347 1  T4JUMP   INDEX   DSRUPTSW
0119                      12,2135  1 2136 0           TCF     +1

0120  REF   1             12,2136  0 3166 0           TC      RCSMONIT
0121  REF   1             12,2137  0 3161 1           TC      NORRGMON      WAS TCF RRAUTCHK (NO RADAR IN 206).
0122  REF   1             12,2140  1 2305 1           TCF     IMUMON
0123  REF   1             12,2141  1 3161 0           TCF     DAPT4S
0124  REF   2 LAST  61    12,2142  1 5733 1           TCF     RESUME
0125  REF   2 LAST 108    12,2143  0 3161 1           TC      NORRGMON      WAS TCF RRAUTCHK (NO RADAR IN 206).
0126  REF   2 LAST 108    12,2144  1 2305 1           TCF     IMUMON
0127  REF   2 LAST 108    12,2145  1 3161 0           TCF     DAPT4S

0128  REF   1             12,2146   02023 1  LOSKYRS  ADRES   DSKYRSET
0129  REF   2 LAST  99    12,2147   02013 1  LLMPRS   ADRES   LMPRESET

0130                      12,2150  37775 0  30MRUPT  OCT     16381
0131                      12,2151  37776 0  20MRUPT  OCT     16382
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 6 S3 E6

P0132 THIS ROUTINE SERVICES THE METER OUTPUTS.

R0133 DIDFLG INDICATES THE STATE OF THE PROGRAM.....
R0134 IF GREATER THAN ZERO, THEN UNABLE TO DISPLAY DATA
R0135 IF EQUAL TO ZERO, THEN THE PROGRAM IS IN USE
R0136 IF LESS THAN ZERO, THEN THE PROGRAM IS ABLE TO BE USED.....

```
0137  REF   1                12,2152  0 2225 0  ALTOUT   TC     DISINDAT
0138  REF   1                12,2153  4 7762 1           CS     BIT2
0139                         12,2154  0 0006 1           EXTEND
0140                         12,2155  03 014 1           WAND   14          SET UP OUTPUT FOR ALTITUDE
0141  REF   1                12,2156  10 351 1           CCS    ALT        -1 IF OLD DATA TO BE EXTRAPOLATED.
0142                         12,2157  1 2163 0           TCF    +4         NEW DATA.
0143                         12,2160  1 2163 0           TCF    +3
0144  REF   1                12,2161  1 2167 1           TCF    OLDDATA

0145  REF   2 LAST 109       12,2162  54 351 1           TS     ALT        CHANGE -0 IN ALT TO +0.
0146  REF  10 LAST 107       12,2163  4 7763 0           CS     ONE        RESET ALTSAVE.
0147  REF   3 LAST 109       12,2164  52 352 1           XCH    ALT
0148  REF   1                12,2165  52 364 1  ZDATA2   XCH    ALTSAVE
0149  REF   1                12,2166  1 2207 1           TCF    NEWDATA

0150  REF   1                12,2167  3 0353 1  OLDDATA  CA     ALTRATE    USE ALTRATE TO EXTRAPOLATE.
0151                         12,2170  0 0006 1           EXTEND
0152  REF   1                12,2171  7 2302 0           MP     ARTOA      RATE APPLIES FOR .96 SEC.
0153  REF   2 LAST 109       12,2172  6 0364 0           AD     ALTSAVE +1
0154  REF   3 LAST 109       12,2173  54 364 1           TS     ALTSAVE +1 AND MAYBE SKIP.
0155  REF  17 LAST 107       12,2174  3 7767 0           CAF    ZERO
0156  REF   4 LAST 109       12,2175  26 363 0           ADS    ALTSAVE

0157  REF   3 LAST  96       12,2176  3 7743 0           CAF    POSMAX     FORCE SIGN AGREEMENT ASSUMING ALTSAVE IS
0158  REF  11 LAST 109       12,2177  6 7763 1           AD     ONE        NOT NEGATIVE. IF IT IS, THE FINAL TS
0159  REF   5 LAST 109       12,2200  6 0364 0           AD     ALTSAVE +1 WILL NOT SKIP AND WE CAN SET ALTSAVE TO
0160  REF   6 LAST 109       12,2201  54 364 1           TS     ALTSAVE +1 ZERO IN THAT CASE.
0161  REF  18 LAST 109       12,2202  3 7767 0           CAF    ZERO
0162  REF   4 LAST 109       12,2203  6 7743 0           AD     POSMAX
0163  REF   7 LAST 109       12,2204  6 0363 1           AD     ALTSAVE
0164  REF   8 LAST 109       12,2205  54 363 0           TS     ALTSAVE
0165  REF   1                12,2206  1 2277 0           TCF    ZERODATA   ALTSAVE NEGATIVE - SET TO ZERO.

0166  REF   9 LAST 109       12,2207  10 363 0  NEWDATA  CCS    ALTSAVE    MAKE UP 15 BIT UNSIGNED OUTPUT.
0167  REF   6 LAST  93       12,2210  3 7745 0           CAF    BIT15      MAJOR PART +1 OR +0.
0168  REF  10 LAST 109       12,2211  6 0364 0           AD     ALTSAVE +1
0169  REF   1                12,2212  54 060 0  METEROUT TS     ALTM
0170  REF   1                12,2213  3 2303 0           CAF    BITSET
0171                         12,2214  0 0006 1           EXTEND
0172                         12,2215  05 014 1           WOR    14
0173  REF   1                12,2216  1 2276 1           TCF    DONEDID
```

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```
0174  REF   2 LAST 109     12,2217  0 2225 0  ALTROUT  TC     DISINDAT
0175  REF   2 LAST 109     12,2220  3 7762 0           CAF    BIT2
0176                       12,2221  0 0006 1           EXTEND
0177                       12,2222  05 014 1           WOR    14          SET UP OUTPUT FOR ALT. RATE
0178  REF   2 LAST 109     12,2223  3 0353 1           CA     ALTRATE
0179  REF   1              12,2224  1 2212 0           TCF    METEROUT

0180  REF   2 LAST  97     12,2225  10 350 0  DISINDAT CCS    DIDFLG
0181  REF   1              12,2226  1 2273 1           TCF    ALLDONE     NOTE THAT THIS SHOULD ALWAYS GO TO
A0182                                                                    ALLDONE AND NOT DONEDID SINCE THE
A0183                                                                    AVAILABILITY OF DATA MAY DISAPPEAR WHILE
A0184                                                                    THE ASTRONAUT HAS THE BUTTON DOWN.
0185                       12,2227  1 2230 0           NOOP
0186  REF   2 LAST  98     12,2230  3 7756 1           CAF    BIT6
0187                       12,2231  0 0006 1           EXTEND
0188                       12,2232  02 030 0           RAND   30          CHECK DISPLAY INERTIAL DATA BIT
0189  REF  28 LAST  94     12,2233  10 000 0           CCS    A
0190  REF   2 LAST 110     12,2234  1 2273 1           TCF    ALLDONE
0191  REF   3 LAST 110     12,2235  10 350 0           CCS    DIDFLG
0192                       12,2236  1 2237 1           NOOP
0193  REF   1              12,2237  1 2260 0           TCF    GOAGN

0194  REF   2 LAST  82     12,2240  3 7754 0  FIRSTIME CAF    BIT8
0195                       12,2241  0 0006 1           EXTEND
0196                       12,2242  05 012 1           WOR    12          ENABLE DISPLAY INERTIAL DATA
0197  REF  19 LAST 109     12,2243  3 7767 0           CAF    ZERO
0198  REF   4 LAST 110     12,2244  54 350 0           TS     DIDFLG
0199  REF   1              12,2245  54 362 1           TS     LASTXCMD
0200  REF   1              12,2246  54 361 1           TS     LASTYCMD
0201  REF   1              12,2247  3 6306 1           CAF    SIX
0202  REF   3 LAST  89     12,2250  0 5663 1           TC     WAITLIST
0203  REF   3 LAST 104                E6               EBANK= W11
0204                       12,2251   02254 0           2CADR  INTLZE
C0204 REF   1              12,2252   24066 1
0205  REF   2 LAST 109     12,2253  0 2276 0           TC     DONEDID

0206  REF   3 LAST 110     12,2254  3 7762 0  INTLZE   CAF    BIT2
0207                       12,2255  0 0006 1           EXTEND
0208                       12,2256  05 012 1           WOR    12          ENABLE RR ERROR COUNTER
0209  REF   1              12,2257  0 5727 0           TC     TASKOVER

0210  REF   2 LAST 110     12,2260  4 0362 1  GOAGN    CS     LASTXCMD
0211  REF   1              12,2261  6 0357 0           AD     FORVEL
0212  REF   1              12,2262  54 054 1           TS     OPTXCMD
0213  REF   2 LAST 110     12,2263  3 0357 0           CA     FORVEL
0214  REF   3 LAST 110     12,2264  54 362 1           TS     LASTXCMD
0215  REF   2 LAST 110     12,2265  4 0361 1           CS     LASTYCMD
0216  REF   1              12,2266  6 0360 1           AD     LATVEL
0217  REF   1              12,2267  54 053 0           TS     OPTYCMD
0218  REF   2 LAST 110     12,2270  3 0360 1           CA     LATVEL
```

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```
0219  REF   3 LAST 110    12,2271  54 361 1            TS      LASTYCMD
0220  REF  21 LAST  98    12,2272  0 0002 0            TC      Q

0221  REF   1             12,2273  4 2304 0  ALLDONE   CS      DIDRESET      REMOVE DISPLAY INERTIAL DATA AND ECTR.
0222                      12,2274  0 0006 1            EXTEND
0223                      12,2275  03 012 1            WAND    12            RESET RR ERROR COUNTER
0224  REF   3 LAST 108    12,2276  1 5733 1  DONEDID   TCF     RESUME        ** FIX LATER**

0225  REF  20 LAST 110    12,2277  3 7767 0  ZERODATA  CAF     ZERO
0226  REF  16 LAST  94    12,2300  54 001 1            TS      L
0227  REF   1             12,2301  1 2165 0            TCF     ZDATA2

0228                      12,2302   06432 1  ARTOA     DEC     .20469        ALT DUE TO ALTRATE FOR .96 SEC.
0229                      12,2303   06004 0  BITSET    OCT     6004

0230                      12,2304   00202 1  DIDRESET  OCT     202
```

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P0231 PROGRAM NAME: IMUMON

R0232 FUNCTIONAL DESCRIPTION: THIS PROGRAM IS ENTERED EVERY 480 MS. IT DETECTS CHANGES OF THE IMU STATUS BITS IN
R0234 CHANNEL 30 AND CALLS THE APPROPRIATE SUBROUTINES. THE BITS PROCESSED AND THEIR RELEVANT SUBROUTINES ARE:

	FUNCTION	BIT	SUBROUTINE CALLED
R0236			
R0237			
R0238	TEMP IN LIMITS	15	TLIM
R0239	ISS TURN-ON REQUEST	14	ITURNON
R0240	IMU FAIL	13	IMUFAIL (SETISSW)
R0241	IMU CDU FAIL	12	ICDUFAIL (SETISSW)
R0242	IMU CAGE	11	IMUCAGE
R0243	IMU OPERATE	9	IMUOP

R0244 THE LAST SAMPLED STATE OF THESE BITS IS LEFT IN IMODES30. ALSO, EACH SUBROUTINE CALLED FINDS THE NEW
R0246 VALUE OF THE BIT IN A, WITH Q SET TO THE PROPER RETURN LOCATION, NXTIFAIL.

R0248 CALLING SEQUENCE: T4RUPT EVERY 480 MILLISECONDS.

R0249 JOBS OR TASKS INITIATED: NONE.

R0250 SUBROUTINES CALLED: TLIM, ITURNON, SETISSW, IMUCAGE, IMUOP.

R0251 ERASABLE INITIALIZATION:
R0252 FRESH START OR RESTART WITH NO GROUPS ACTIVE: C(IMODES30) = OCT 37411.
R0254 RESTART WITH ACTIVE GROUPS: C(IMODES30) = (B(IMODES30)AND(OCT 00035)) PLUS OCT 37400.
R0256 THIS LEAVES IMU FAIL BITS INTACT.

R0257 ALARMS: NONE.

R0258 EXIT: TNONTEST.

R0259 OUTPUT: UPDATED IMODES30 WITH CHANGES PROCESSED BY APPROPRIATE SUBROUTINE.

```
0269  REF   4 LAST  93     12,2305  3 0365 1  IMUMON   CA      IMODES30        SEE IF THERE HAS BEEN A CHANGE IN THE
0270                       12,2306  0 0006 1           EXTEND                  RELEVANT BITS OF CHAN 30.
0271                       12,2307  06 030 1           RXOR    30
0272  REF   1              12,2310  7 3025 1           MASK    30RDMSK
0273                       12,2311  0 0006 1           EXTEND
0274  REF   1              12,2312  1 2342 1           BZF     TNONTEST        NO CHANGE IN STATUS.

0275  REF   7 LAST  83     12,2313  54 070 1           TS      RUPTREG1        SAVE BITS WHICH HAVE CHANGED.
0276  REF   5 LAST 112     12,2314  22 365 1           LXCH    IMODES30        UPDATE IMODES30.
0277                       12,2315  0 0006 1           EXTEND
0278  REF  17 LAST 111     12,2316  06 001 0           RXOR    L
0279  REF   6 LAST 112     12,2317  54 365 0           TS      IMODES30

0280  REF  12 LAST 109     12,2320  4 7763 0           CS      ONE
0281  REF   8 LAST 112     12,2321  56 070 0           XCH     RUPTREG1
0282                       12,2322  0 0006 1           EXTEND
```

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```
0283  REF   1                 12,2323  6 2614 0            BZMF    TLIM        CHANGE IN IMU TEMP.
0284  REF   1                 12,2324  1 2326 0            TCF     NXTIFBIT    BEGIN BIT SCAN.

0285  REF  13 LAST 112        12,2325  6 7763 1  -1        AD      ONE         (RE-ENTERS HERE FROM NXTIFAIL.)
0286  REF   9 LAST 112        12,2326  24 070 0  NXTIFBIT  INCR    RUPTREG1    ADVANCE BIT POSITION NUMBER.
0287                          12,2327  6 0000 1  +1        DOUBLE
0288  REF  29 LAST 110        12,2330  54 000 0            TS      A           SKIP IF OVERFLOW.
0289  REF   2 LAST 113        12,2331  1 2326 0            TCF     NXTIFBIT    LOOK FOR BIT.

0290  REF   4 LAST  83        12,2332  56 071 1            XCH     RUPTREG2    SAVE OVERFLOW-CORRECTED DATA.
0291  REF  10 LAST 113        12,2333  50 070 0            INDEX   RUPTREG1    SELECT NEW VALUE OF THIS BIT.
0292  REF   3 LAST  92        12,2334  3 7746 0            CAF     BIT14
0293  REF   7 LAST 112        12,2335  7 0365 0            MASK    IMODFS30
0294  REF  11 LAST 113        12,2336  50 070 0            INDEX   RUPTREG1
0295  REF   1                 12,2337  0 3021 1            TC      IFAILJMP

0296  REF   5 LAST 113        12,2340  10 071 0  NXTIFAIL  CCS     RUPTREG2    PROCESS ANY ADDITIONAL CHANGES.
0297  REF   3 LAST 113        12,2341  1 2325 0            TCF     NXTIFBIT -1
```

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P0298 PROGRAM NAME: TNONTEST.

R0299 FUNCTIONAL DESCRIPTION: THIS PROGRAM HONORS REQUESTS FOR ISS INITIALIZATION. ISS TURN-ON (CHANNEL 30 BIT 14)
R0301 AND ISS OPERATE (CHANNEL 30 BIT 9) REQUESTS ARE TREATED AS A PAIR AND PROCESSING TAKES PLACE .480 SECONDS
R0303 AFTER EITHER ONE APPEARS. THIS INITIALIZATION TAKES ON ONE OF THE FOLLOWING THREE FORMS:

R0305 1) ISS TURN-ON: IN THIS SITUATION THE COMPUTER IS OPERATING WHEN THE ISS IS TURNED ON. NOMINALLY,
R0307 BOTH ISS TURN-ON AND ISS OPERATE APPEAR. THE PLATFORM IS CAGED FOR 90 SECONDS AND THE ICDU'S ZEROED
R0309 SO THAT AT THE END OF THE PROCESS THE GIMBAL LOCK MONITOR WILL FUNCTION PROPERLY.

R0311 2) ICDU INITIALIZATION: IN THIS CASE THE COMPUTER WAS PROBABLY TURNED ON WITH THE ISS IN OPERATE OR
R0313 A FRESH START WAS DONE WITH THE ISS IN OPERATE. IN THIS CASE ONLY ISS OPERATE IS ON. THE ICDU'S ARE
R0315 ZEROED SO THE GIMBAL LOCK MONITOR WILL FUNCTION. AN EXCEPTION IS IF THE ISS IS IN GIMBAL LOCK AFTER
R0317 A RESTART, THE ICDU'S WILL NOT BE ZEROED.

R0318 3) RESTART WITH RESTARTABLE PROGRAM USING THE IMU: IN THIS CASE, NO INITIALIZATION TAKES PLACE SINCE
R0320 IT IS ASSUMED THAT THE USING PROGRAM DID THE INITIALIZATION AND THEREFORE T4RUPT SHOULD NOT INTERFERE.

R0322 IMODES30 BIT 7 IS SET = 1 BY THE FIRST BIT (CHANNEL 30 BIT 14 OR 9) WHICH ARRIVES. FOLLOWING THIS, TNONTEST IS
R0324 ENTERED, FINDS BIT 7 = 1 BUT BIT 8 = 0, SO IT SETS BIT 8 = 1 AND EXITS. THE NEXT TIME IT FINDS BIT 8 = 1 AND
R0326 PROCEEDS, SETTING BITS 8 AND 7 = 0. AT PROCTNON, IF ISS TURN-ON REQUEST IS PRESENT, THE ISS IS CAGED (ZERO +
R0328 COARSE). IF ISS OPERATE IS NOT PRESENT PROGRAM ALARM 00213 IS ISSUED. AT THE END OF A 90 SECOND CAGE, BIT 2
R0330 OF IMODES30 IS TESTED. IF IT IS = 1, ISS TURN-ON WAS NOT PRESENT FOR THE ENTIRE 90 SECONDS. IN THAT CASE, IF
R0332 THE ISS TURN-ON REQUEST IS PRESENT THE 90 SECOND WAIT IS REPEATED, OTHERWISE NO ACTION OCCURS UNLESS A PROGRAM
R0334 WAS WAITING FOR THE INITIALIZATION IN WHICH CASE THE PROGRAM IS GIVEN AN IMUSTALL ERROR RETURN. IF THE DELAY
R0336 WENT PROPERLY, THE ISS DELAY OUTBIT IS SENT AND THE ICDU'S ZEROED. A TASK IS INITIATED TO REMOVE THE PIPA FAIL
R0338 INHIBIT BIT IN 10.24 SECONDS. IF A MISSION PROGRAM WAS WAITING IT IS INFORMED VIA ENDIMU.

R0340 AT PROCTNON, IF ONLY ISS OPERATE IS PRESENT (OPONLY), THE CDU'S ARE ZEROED UNLESS THE PLATFORM IS IN COARSE
R0342 ALIGN (= GIMBAL LOCK HERE) OR A MISSION PROGRAM IS USING THE IMU (IMUSEFLG = 1).

R0344 CALLING SEQUENCE: T4RUPT EVERY 480 MILLISECONDS AFTER IMUMON.

R0345 JOBS OR TASKS INITIATED: 1) ENDTNON, 90 SECONDS AFTER CAGING STARTED. 2) ISSUP, 4 SECONDS AFTER CAGING DONE.
R0347 3) PFAILOK, 10.24 SECONDS AFTER INITIALIZATION COMPLETED. 4) UNZ2, 320 MILLISECONDS AFTER ZEROING
R0349 STARTED.

R0350 SUBROUTINES CALLED: CAGESUB, CAGESUB2, ZEROICDU, ENDIMU, IMUBAD, NOATTOFF, SETISSW, VARDELAY.

R0352 ERASABLE INITIALIZATION: SEE IMUMON.

R0353 ALARMS: PROGRAM ALARM 00213 IF ISS TURN-ON REQUESTED WITHOUT ISS OPERATE.

R0355 EXIT: ENDTNON EXITS TO C33TEST. TASKS HAVING TO DO WITH INITIALIZATION EXIT AS FOLLOWS: MISSION PROGRAM
R0357 WAITING AND INITIALIZATION COMPLETE, EXIT TO ENDIMU, MISSION PROGRAM WAITING AND INITIALIZATION FAILED, EXIT TO
R0359 IMUBAD, IMU NOT IN USE, EXIT TO TASKOVER.

R0360 OUTPUT: ISS INITIALIZED.

0361 REF 8 LAST 113 12,2342 4 0365 0 TNONTEST C5 IMODES30 AFTER PROCESSING ALL CHANGES, SEE IF IT

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```
0362  REF   2 LAST  82   12,2343  7 7755 0          MASK   BIT7        IS TIME TO ACT ON A TURN-ON SEQUENCE.
0363  REF  30 LAST 113   12,2344  10 000 0          CCS    A
0364  REF   1            12,2345  1 2477 0          TCF    C33TEST     NO - EXAMINE CHANNEL 33.

0365  REF   3 LAST 110   12,2346  3 7754 0          CAF    BIT8        SEE IF FIRST SAMPLE OR SECOND.
0366  REF   9 LAST 114   12,2347  7 0365 0          MASK   IMODES30
0367  REF  31 LAST 115   12,2350  10 000 0          CCS    A
0368  REF   1            12,2351  1 2355 1          TCF    PROCTNON    REACT AFTER SECOND SAMPLE.

0369  REF   4 LAST 115   12,2352  3 7754 0          CAF    BIT8        IF FIRST SAMPLE, SET BIT TO REACT NEXT
0370  REF  10 LAST 115   12,2353  26 365 0          ADS    IMODES30    TIME.
0371  REF   2 LAST 115   12,2354  1 2477 0          TCF    C33TEST

R0372          PROCESS IMU TURN-ON REQUESTS AFTER WAITING 1 SAMPLE FOR ALL SIGNALS TO ARRIVE.

0374  REF   1            12,2355  4 3044 0  PROCTNON CS     BITS768
0375  REF  11 LAST 115   12,2356  7 0365 0          MASK   IMODES30
0376  REF  12 LAST 115   12,2357  54 365 0          TS     IMODES30
0377  REF   4 LAST 113   12,2360  7 7746 1          MASK   BIT14       SEE IF TURN-ON REQUEST.
0378  REF  32 LAST 115   12,2361  10 000 0          CCS    A
0379  REF   1            12,2362  1 2455 0          TCF    OPONLY      OPERATE ON ONLY.

0380  REF  13 LAST 115   12,2363  4 0365 0          CS     IMODES30    IF TURN-ON REQUEST, WE SHOULD HAVE IMU
0381  REF   1            12,2364  7 7753 0          MASK   BIT9        OPERATE.
0382  REF  33 LAST 115   12,2365  10 000 0          CCS    A
0383                     12,2366  1 2371 1          TCF    +3

0384  REF   5 LAST 101   12,2367  0 4755 1          TC     ALARM       ALARM IF NOT.
0385                     12,2370   00213 1          OCT    213

0386  REF   1            12,2371  0 3002 0  +3      TC     CAGESUB
0387  REF   1            12,2372  3 3052 0          CAF    90SECS
0388  REF   4 LAST 110   12,2373  0 5663 1          TC     WAITLIST
0389  REF   4 LAST 110                 E6          EBANK= 1311
0390                     12,2374   02401 0          2CADR  ENDTNON
C0390 REF   1            12,2375   24066 1
0391  REF   3 LAST 115   12,2376  1 2477 0          TCF    C33TEST

0392  REF   2 LAST 115   12,2377  3 3052 0  RETNON  CAF    90SECS
0393  REF   1            12,2400  0 5704 1          TC     VARDELAY

0394  REF   4 LAST 110   12,2401  4 7762 1  ENDTNON CS     BIT2        RESET TURN-ON REQUEST FAIL BIT.
0395  REF  14 LAST 115   12,2402  7 0365 0          MASK   IMODES30
0396  REF  15 LAST 115   12,2403  56 365 1          XCH    IMODES30
0397  REF   5 LAST 115   12,2404  7 7762 1          MASK   BIT2        IF IT WAS OFF, SEND ISS DELAY COMPLETE.
0398                     12,2405  0 0006 1          EXTEND
0399  REF   1            12,2406  1 2421 0          BZF    ENDTNON2

0400  REF   5 LAST 115   12,2407  3 7746 0          CAF    BIT14       IF IT WAS ON AND TURN-ON REQUEST NOW
0401  REF  16 LAST 115   12,2410  7 0365 0          MASK   IMODES30    PRESENT, RE-ENTER 90 SEC DELAY IN WL.
```

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```
0402                        12,2411  0 0006 1          EXTEND
0403  REF   1              12,2412  1 2377 1          BZF     RETNON

0404  REF   9 LAST  89      12,2413  4 0074 0          CS      STATE          IF IT IS NOT ON NOW, SEE IF A PROG WAS
0405  REF   1              12,2414  7 7754 1          MASK    IMUSEFLG       WAITING.
0406  REF  34 LAST 115      12,2415  10 000 0          CCS     A
0407  REF   2 LAST 110      12,2416  1 5727 1          TCF     TASKOVER
0408  REF   4 LAST 102      12,2417  0 5225 1          TC      POSTJUMP
0409  REF   1              12,2420   26672 0          CADR    IMUBAD         UNSUCCESSFUL TURN-ON.

0410  REF   7 LAST 109      12,2421  3 7745 0 ENDTNON2 CAF     BIT15          SEND ISS DELAY COMPLETE.
0411                        12,2422  0 0006 1          EXTEND
0412                        12,2423  05 012 1          WOR     12

0413  REF  10 LAST 102      12,2424  0 5270 1          TC      IBNKCALL       TURN OFF NO ATT LAMP.
0414  REF   1              12,2425   26324 0          CADR    NOATTOFF

0415  REF   1              12,2426  0 4314 0 JNZ2     TC      ZEROICDU

0416  REF   1              12,2427  4 3041 0          CS      BITS465        REMOVE ZERO AND COARSE.
0417                        12,2430  0 0006 1          EXTEND
0418                        12,2431  03 012 1          WAND    12

0419  REF   1              12,2432  3 4321 0          CAF     4SECS          WAIT 4 SECS FOR COUNTERS TO FIND GIMBALS
0420  REF   2 LAST 115      12,2433  0 5704 1          TC      VARDELAY

0421  REF   1              12,2434  4 3042 0 ISSUP    CS      OCT54          REMOVE CAGING, IMU FAIL INHIBIT, AND
0422  REF  17 LAST 115      12,2435  7 0365 0          MASK    IMODES30       ICDUFAIL INHIBIT FLAGS.
0423  REF  18 LAST 116      12,2436  54 365 0          TS      IMODES30

0424  REF   1              12,2437  0 2753 1          TC      SETISSW        ISS WARNING MIGHT HAVE BEEN INHIBITED.

0425  REF   8 LAST 116      12,2440  4 7745 1          CS      BIT15          REMOVE IMU DELAY COMPLETE DISCRETE.
0426                        12,2441  0 0006 1          EXTEND
0427                        12,2442  03 012 1          WAND    12

0428  REF   1              12,2443  3 7751 0          CAF     BIT11          DONT ENABLE PROG ALARM ON PIP FAIL FOR
0429  REF   5 LAST 115      12,2444  0 5663 1          TC      WAITLIST       ANOTHER 10 SECS.
0430  REF   5 LAST 115                    E6          EBANK=  MM11
0431                        12,2445   02310 1          2CADR   PFAILOK
C0431 REF   1              12,2446   26066 0
0432  REF  10 LAST 116      12,2447  4 0074 0          CS      STATE          SEE IF ANYONE IS WAITING FOR THE IMU AT
0433  REF   2 LAST 116      12,2450  7 7754 1          MASK    IMUSEFLG       IMUZERO. IF SO, WAKE THEM UP.
0434  REF  35 LAST 116      12,2451  10 000 0          CCS     A
0435  REF   3 LAST 116      12,2452  1 5727 1          TCF     TASKOVER

0436  REF   5 LAST 116      12,2453  0 5225 1          TC      POSTJUMP
0437  REF   1              12,2454   26664 1          CADR    ENDIMU

0438  REF   3 LAST  93      12,2455  3 7760 1 OPONLY   CAF     BIT4           IF OPERATE ON ONLY, AND WE ARE IN COARSE
```

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```
0439                          12,2456  0 0006 1   EXTEND
0440                          12,2457  02 012 0   RAND    12          ALIGN, DONT ZERO THE CDUS BECAUSE WE
0441  REF  36 LAST 116       12,2460  10 000 0   CCS     A           MIGHT BE IN GIMBAL LOCK.
0442  REF   4 LAST 115       12,2461  1 2477 0   TCF     C33TEST

0443  REF   3 LAST 116       12,2462  3 7754 0   CAF     IMUSEFLG    OTHERWISE, ZERO THE COUNTERS
0444  REF  11 LAST 116       12,2463  7 0074 0   MASK    STATE       UNLESS SOMEONE IS USING THE IMU.
0445  REF  37 LAST 117       12,2464  10 000 0   CCS     A
0446  REF   5 LAST 117       12,2465  1 2477 0   TCF     C33TEST

0447  REF   1                 12,2466  0 3014 1   TC      CAGESUB2    SET TURNON FLAGS.

0448  REF   2 LAST  92        12,2467  3 7757 0   CAF     BIT5
0449                          12,2470  0 0006 1   EXTEND
0450                          12,2471  05 012 1   WOR     12

0451  REF   3 LAST 110        12,2472  3 7756 1   CAF     BIT6        WAIT 300 MS FOR AGS TO RECEIVE SIGNAL.
0452  REF   6 LAST 116        12,2473  0 5663 1   TC      WAITLIST
0453  REF   6 LAST 116                       E6  EBANK=  M11
0454                          12,2474   02426 0   2CADR   JNZ2
C0454 REF   1                 12,2475   24066 1
0455  REF   6 LAST 117        12,2476  1 2477 0   TCF     C33TEST
```

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P0456 PROGRAM NAME: C33TEST

R0457 FUNCTIONAL DESCRIPTION: THIS PROGRAM MONITORS THREE FLIP-FLOP INBITS OF CHANNEL 33 AND CALLS THE APPROPRIATE
R0459 SUBROUTINE TO PROCESS A CHANGE. IT IS ANALOGOUS TO IMUMON, WHICH MONITORS CHANNEL 30, EXCEPT THAT IT READS
R0461 CHANNEL 33 WITH A WAND INSTRUCTION BECAUSE A 'WRITE' PULSE IS REQUIRED TO RESET THE FLIP-FLOPS. THE BITS
R0463 PROCESSED AND THE SUBROUTINES CALLED ARE:

	BIT	FUNCTION	SUBROUTINE
R0464	---	--------	----------
R0466	13	PIPA FAIL	PIPFAIL
R0467	12	DOWNLINK TOO FAST	DNTMFAST
R0468	11	UPLINK TOO FAST	UPTMFAST

R0469 UPON ENTRY TO THE SUBROUTINE, THE NEW BIT STATE IS IN A.

R0470 CALLING SEQUENCE: EVERY 480 MILLISECONDS AFTER TMONTEST.

R0471 JOBS OR TASKS INITIATED: NONE.

R0472 SUBROUTINES CALLED: PIPFAIL, DNTMFAST AND UPTMFAST ON BIT CHANGES.

R0473 ERASABLE INITIALIZATION: C(IMODES33) = OCT 16000 ON A FRESH START OR RESTART, THEREFORE, THESE ALARMS WILL
R0475 REAPPEAR IF THE CONDITIONS PERSIST.

R0476 ALARMS: NONE.

R0477 EXIT: GLOCKMON.

R0478 OUTPUT: UPDATED BITS 13, 12 AND 11 OF IMODES33 WITH CHANGES PROCESSED.

```
0479  REF   2 LAST  98     12,2477  3 0366 1  C33TEST  CA      IMODES33      SEE IF RELEVANT CHAN 33 BITS HAVE
0480  REF   1              12,2500  7 5642 0            MASK    33RDMSK
0481  REF  18 LAST 112     12,2501  54 001 1            TS      L             CHANGED.
0482  REF   2 LAST 118     12,2502  3 5642 1            CAF     33RDMSK
0483                       12,2503  0 0006 1            EXTEND
0484                       12,2504  03 033 1            WAND    33            RESETS FLIP-FLOP INPUTS.
0485                       12,2505  0 0006 1            EXTEND
0486  REF  19 LAST 118     12,2506  06 001 0            RXOR    L
0487                       12,2507  0 0006 1            EXTEND
0488  REF   1              12,2510  1 2537 0            BZF     GLOCKMON      ON NO CHANGE.

0489  REF  12 LAST 113     12,2511  54 070 1            TS      RUPTREG1      SAVE BITS WHICH HAVE CHANGED.
0490  REF   3 LAST 118     12,2512  22 366 1            LXCH    IMODES33
0491                       12,2513  0 0006 1            EXTEND
0492  REF  20 LAST 118     12,2514  06 001 0            RXOR    L
0493  REF   4 LAST 118     12,2515  54 366 0            TS      IMODES33      UPDATED IMODES33.

0494  REF  21 LAST 111     12,2516  3 7767 0            CAF     ZERO
0495  REF  13 LAST 118     12,2517  56 070 0            XCH     RUPTREG1
0496                       12,2520  6 0000 1            DOUBLE
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 16 S3 E6

```
0497  REF   1                 12,2521  1 2524 1                TCF     NXTIBT +1       SCAN FOR BIT CHANGES.

0498  REF  14 LAST 113        12,2522  6 7763 1  -1            AD      ONE
0499  REF  14 LAST 118        12,2523  24 070 0  NXTIBT        INCR    RUPTREG1
0500                          12,2524  6 0000 1  +1            DOUBLE
0501  REF  38 LAST 117        12,2525  54 000 0                TS      A               (CODING IDENTICAL TO CHAN 30).
0502  REF   2 LAST 119        12,2526  1 2523 0                TCF     NXTIBT

0503  REF   6 LAST 113        12,2527  56 071 1                XCH     RUPTREG2
0504  REF  15 LAST 119        12,2530  50 070 0                INDEX   RUPTREG1        GET NEW VALUE OF BIT WHICH CHANGED.
0505  REF   1                 12,2531  3 7747 1                CAF     BIT13
0506  REF   5 LAST 118        12,2532  7 0366 0                MASK    IMODFS33
0507  REF  16 LAST 119        12,2533  50 070 0                INDEX   RUPTREG1
0508  REF   1                 12,2534  0 3027 1                TC      C33JMP

0509  REF   7 LAST 119        12,2535  10 071 0  NXTFL33       CCS     RUPTREG2        PROCESS POSSIBLE ADDITIONAL CHANGES.
0510  REF   3 LAST 119        12,2536  1 2522 1                TCF     NXTIBT -1
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 17 S3 E6

```
P0511   PROGRAM NAME:  GLOCKMON

R0512   FUNCTIONAL DESCRIPTION:  THIS PROGRAM MONITORS THE CDUZ COUNTER TO DETERMINE WHETHER THE ISS IS IN GIMBAL LOCK
R0514   AND TAKES ACTION IF IT IS.  THREE REGIONS OF MIDDLE GIMBAL ANGLE (MGA) ARE USED:

R0516           1) ABS(MGA) LESS THAN OR EQUAL TO 70 DEGREES - NORMAL MODE.
R0517           2) ABS(MGA) GREATER THAN 70 DEGREES AND LESS THAN OR EQUAL TO 85 DEGREES - GIMBAL LOCK LAMP TURNED ON.
R0519           3) ABS(MGA) GREATER THAN 85 DEGREES - ISS PUT IN COARSE ALIGN AND NO ATT LAMP TURNED ON.

R0521   CALLING SEQUENCE:  EVERY 480 MILLISECONDS AFTER C33TEST.

R0522   JOBS OR TASKS INITIATED:  NONE.

R0523   SUBROUTINES CALLED:  1) SETCOARS WHEN ABS(MGA) GREATER THAN 85 DEGREES AND ISS NOT IN COARSE ALIGN.
R0525                        2) LAMPTEST BEFORE TURNING OFF GIMBAL LOCK LAMP.

R0526   ERASABLE INITIALIZATION:
R0527           1) FRESH START OR RESTART WITH NO GROUPS ACTIVE:  C(CDUZ) = 0, IMODES30 BIT 6 = 0, IMODES33 BIT 1 = 0.
R0529           2) RESTART WITH GROUPS ACTIVE:  SAME AS FRESH START EXCEPT C(CDUZ) NOT CHANGED SO GIMBAL MONITOR
R0531                                           PROCEEDS AS BEFORE.

R0532   ALARMS:  1) MGA REGION (2) CAUSES GIMBAL LOCK LAMP TO BE LIT.
R0533           2) MGA REGION (3) CAUSES THE ISS TO BE PUT IN COARSE ALIGN AND THE NO ATT LAMP TO BE LIT IF EITHER NOT
R0535              SO ALREADY.

 0536  REF   1                 12,2537  10 034 1  GLOCKMON CCS     CDUZ
 0537  REF   1                 12,2540  1 2544 1            TCF     GLOCKCHK        SEE IF MAGNITUDE OF MGA IS GREATER THAN
 0538  REF   1                 12,2541  1 2564 0            TCF     SETGLOCK        70 DEGREES.
 0539  REF   2 LAST 120        12,2542  1 2544 1            TCF     GLOCKCHK
 0540  REF   2 LAST 120        12,2543  1 2564 0            TCF     SETGLOCK

 0541  REF   1                 12,2544  6 2611 0  GLOCKCHK AD      -70DEGS
 0542                          12,2545  0 0006 1            EXTEND
 0543  REF   3 LAST 120        12,2546  6 2563 0            BZMF    SETGLOCK -1     NO LOCK.

 0544  REF   1                 12,2547  6 2612 0            AD      -150DEGS        SEE IF ABS(MGA) GREATER THAN 85 DEGREES.
 0545                          12,2550  0 0006 1            EXTEND
 0546  REF   1                 12,2551  6 2561 1            BZMF    NOGIMRUN

 0547  REF   4 LAST 116        12,2552  3 7760 1            CAF     BIT4            IF SO, SYSTEM SHOULD BE IN COARSE ALIGN
 0548                          12,2553  0 0006 1            EXTEND                  TO PREVENT GIMBAL RUNAWAY.
 0549                          12,2554  02 012 0            RAND    12
 0550  REF   39 LAST 119       12,2555  10 000 0            CCS     A
 0551  REF   2 LAST 120        12,2556  1 2561 0            TCF     NOGIMRUN

 0552  REF   11 LAST 116       12,2557  0 5270 1            TC      IBNKCALL
 0553  REF   1                 12,2560   26232 0            CADR    SETCOARS

 0554  REF   4 LAST 117        12,2561  3 7756 1  NOGIMRUN CAF     BIT6            TURN ON GIMBAL LOCK LAMP.
 0555  REF   4 LAST 120        12,2562  1 2564 0            TCF     SETGLOCK
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 18 S3 E6

```
0556  REF  22 LAST 118   12,2563  3 7767 0  -1        CAF    ZERO
0557  REF  10 LAST 107   12,2564  6 0326 0  SETGLOCK  AD     DSPTAB +11D     SEE IF PRESENT STATE OF GIMBAL LOCK LAMP
0558  REF   5 LAST 120   12,2565  7 7756 0            MASK   BIT6            AGREES WITH DESIRED STATE BY HALF ADDING
0559                     12,2566  0 0006 1            EXTEND                 THE TWO.
0560  REF   1            12,2567  1 5733 1            BZF    GLOCKOK         OK AS IS.

0561  REF  11 LAST 121   12,2570  7 0326 1            MASK   DSPTAB +11D     IF OFF, DONT TURN ON IF IMU BEING CAGED.
0562  REF  40 LAST 120   12,2571  10 000 0            CCS    A
0563  REF   1            12,2572  1 2606 1            TCF    GLAMPTST        TURN OFF UNLESS LAMP TEST IN PROGRESS.

0564  REF   6 LAST 121   12,2573  3 7756 1            CAF    BIT6
0565  REF  19 LAST 116   12,2574  7 0365 0            MASK   IMODFS30
0566  REF  41 LAST 121   12,2575  10 000 0            CCS    A
0567  REF   2 LAST 121   12,2576  1 5733 1            TCF    GLOCKOK

0568  REF  12 LAST 121   12,2577  4 0326 1  GLINVERT  CS     DSPTAB +11D     INVERT GIMBAL LOCK LAMP.
0569  REF   7 LAST 121   12,2600  7 7756 0            MASK   BIT6
0570  REF   9 LAST 116   12,2601  6 7745 0            AD     BIT15           TO INDICATE CHANGE IN DSPTAB +11D.
0571  REF  13 LAST 121   12,2602  56 326 0            XCH    DSPTAB +11D
0572  REF   1            12,2603  7 2613 0            MASK   OCT37737
0573  REF  14 LAST 121   12,2604  26 326 1            ADS    DSPTAB +11D
0574  REF   3 LAST 121   12,2605  1 5733 1            TCF    GLOCKOK

0575  REF   1            12,2606  0 3032 0  GLAMPTST  TC     LAMPTEST        TURN OFF UNLESS LAMP TEST IN PROGRESS.
0576  REF   4 LAST 121   12,2607  1 5733 1            TCF    GLOCKOK
0577  REF   1            12,2610  1 2577 1            TCF    GLINVERT

0578                     12,2611   63434 1  -70DEGS   DEC    -.38888         -70 DEGREES SCALED IN HALF-REVOLUTIONS.
0579                     12,2612   75252 0  -15DEGS   DEC    -.08333
0580                     12,2613   37737 0  OCT37737  OCT    37737
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 19 S3 E6

P0581 PROGRAM NAME: TLIM.

R0582 FUNCTIONAL DESCRIPTION: THIS PROGRAM MAINTAINS THE TEMP LAMP (BIT 4 OF CHANNEL 11) ON THE DSKY TO AGREE WITH
R0584 THE TEMP SIGNAL FROM THE ISS (BIT 15 OF CHANNEL 30). HOWEVER, THE LIGHT WILL NOT BE TURNED OFF IF A LAMP TEST
R0586 IS IN PROGRESS.

R0587 CALLING SEQUENCE: CALLED BY IMUMON ON A CHANGE OF BIT 15 OF CHANNEL 30.

R0588 JOBS OR TASKS INITIATED: NONE.

R0589 SUBROUTINES CALLED: LAMPTEST.

R0590 ERASABLE INITIALIZATION: FRESH START AND RESTART TURN THE TEMP LAMP OFF.

R0592 ALARMS: TEMP LAMP TURNED ON WHEN IMU TEMP GOES OUT OF LIMITS.

R0593 EXIT: NXTIFAIL.

R0594 OUTPUT: SERVICE OF TEMP LAMP. IN A, EXCEPT FOR TLIM.

```
0596  REF   5 LAST 109    12,2614  7 7743 1  TLIM     MASK   POSMAX     REMOVE BIT FROM WORD OF CHANGES AND SET
0597  REF   8 LAST 119    12,2615  54 071 0             TS     RUPTREG2   DSKY TEMP LAMP ACCORDINGLY.

0598  REF  20 LAST 121    12,2616  10 365 0             CCS    IMODES30
0599  REF   1             12,2617  1 2625 0             TCF    TEMPOK
0600  REF   2 LAST 122    12,2620  1 2625 0             TCF    TEMPOK

0601  REF   5 LAST 120    12,2621  3 7760 1             CAF    BIT4       TURN ON LAMP.
0602                      12,2622  0 0006 1             EXTEND
0603                      12,2623  05 011 1             WOR    11
0604  REF   1             12,2624  1 2340 0             TCF    NXTIFAIL

0605  REF   2 LAST 121    12,2625  0 3032 0  TEMPOK     TC     LAMPTEST   IF TEMP NOW OK, DONT TURN OFF LAMP IF
0606  REF   2 LAST 122    12,2626  1 2340 0             TCF    NXTIFAIL   LAMP TEST IN PROGRESS.

0607  REF   6 LAST 122    12,2627  4 7760 0             CS     BIT4
0608                      12,2630  0 0006 1             EXTEND
0609                      12,2631  03 011 1             WAND   11
0610  REF   3 LAST 122    12,2632  1 2340 0             TCF    NXTIFAIL
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 20 S3 E6

P0611 PROGRAM NAME: ITURNON.

R0612 FUNCTIONAL DESCRIPTION: THIS PROGRAM IS CALLED BY IMJMON WHEN A CHANGE OF BIT 14 OF CHANNEL 30 (ISS TURN-ON
R0614 REQUEST) IS DETECTED. UPON ENTRY, ITURNON CHECKS IF A TURN-ON DELAY SEQUENCE HAS FAILED, AND IF SO, IT EXITS.
R0616 IF NOT, IT CHECKS WHETHER THE TURN-ON REQUEST CHANGE IS TO ON OR OFF. IF ON, IT SETS BIT 7 OF IMODES30 TO 1 SO
R0618 THAT TNONTEST WILL INITIATE THE ISS INITIALIZATION SEQUENCE. IF OFF, THE TURN-ON DELAY SIGNAL, CHANNEL 12 BIT
R0620 15, IS CHECKED AND IF IT IS ON, ITURNON EXITS. IF THE DELAY SIGNAL IS OFF, PROGRAM ALARM 00207 IS ISSUED, BIT 2
R0622 OF IMODES30 IS SET TO 1 AND THE PROGRAM EXITS.
R0623 THE SETTING OF BIT 2 OF IMODES30 (ISS DELAY SEQUENCE FAIL) INHIBITS THIS ROUTINE AND IMUOP FROM
R0625 PROCESSING ANY CHANGES. THIS BIT WILL BE RESET BY THE ENDTNON ROUTINE WHEN THE CURRENT 90 SECOND DELAY PERIOD
R0627 ENDS.

R0628 CALLING SEQUENCE: FROM IMUMOM WHEN ISS TURN-ON REQUEST CHANGES STATE.

R0629 JOBS OR TASKS INITIATED: NONE.

R0630 SUBROUTINES CALLED: ALARM, IF THE ISS TURN-ON REQUEST IS NOT PRESENT FOR 90 SECONDS.

R0632 ERASABLE INITIALIZATION: FRESH START AND RESTART SET BIT 15 OF CHANNEL 12 AND BITS 2 AND 7 OF IMODES30 TO 0,
R0634 AND BIT 14 OF IMODES30 TO 1.

R0635 ALARMS: PROGRAM ALARM 00207 IS ISSUED IF THE ISS TURN-ON REQUEST SIGNAL IS NOT PRESENT FOR 90 SECONDS.

R0637 EXIT: NXTIFAIL.

R0638 OUTPUT: BIT 7 OF IMODES30 TO START ISS INITIALIZATION, OR BIT 2 OF IMODES30 AND PROGRAM ALARM 00207 TO INDICATE
R0640 A FAILED TURN-ON SEQUENCE.

```
0641  REF   6 LAST 115    12,2633  3 7762 0  ITURNON  CAF    BIT2      IF DELAY REQUEST HAS GONE OFF
0642  REF  21 LAST 122    12,2634  7 0365 0            MASK   IMODES30  PREMATURELY, DO NOT PROCESS ANY CHANGES
0643  REF  42 LAST 121    12,2635  10 000 0            CCS    A         UNTIL THE CURRENT 90 SEC WAIT EXPIRES.
0644  REF   4 LAST 122    12,2636  1 2340 0            TCF    NXTIFAIL

0645  REF   6 LAST 115    12,2637  3 7746 0            CAF    BIT14     SEE IF JUST ON OR OFF.
0646  REF  22 LAST 123    12,2640  7 0365 0            MASK   IMODES30
0647                      12,2641  0 0006 1            EXTEND
0648  REF   1             12,2642  1 2656 1            BZF    ITURNON2  IF JUST ON.

0649  REF  10 LAST 121    12,2643  3 7745 0            CAF    BIT15
0650                      12,2644  0 0006 1            EXTEND            SEE IF DELAY PRESENT DISCRETE HAS BEEN
0651                      12,2645  02 012 0            RAND   12         SENT. IF SO, ACTION COMPLETE.
0652                      12,2646  0 0006 1            EXTEND
0653                      12,2647  1 2651 0            BZF    +2
0654  REF   5 LAST 123    12,2650  1 2340 0            TCF    NXTIFAIL

0655  REF   7 LAST 123    12,2651  3 7762 0            CAF    BIT2      IF NOT, SET BIT TO INDICATE REQUEST NOT
0656  REF  23 LAST 123    12,2652  26 365 0            ADS    IMODES30  PRESENT FOR FULL DURATION.
0657  REF   6 LAST 115    12,2653  0 4755 1            TC     ALARM
0658                      12,2654   00207 1            OCT    207
0659  REF   6 LAST 123    12,2655  1 2340 0            TCF    NXTIFAIL
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 21 S3 E6

```
0660  REF   3 LAST 115    12,2656  4 7755 0  ITURNON2 CS    BIT7      SET BIT 7 TO INITIATE WAIT OF 1 SAMPLE.
0661  REF  24 LAST 123    12,2657  7 0365 0           MASK  IMODES30
0662  REF   4 LAST 124    12,2660  6 7755 1           AD    BIT7
0663  REF  25 LAST 124    12,2661  54 365 0           TS    IMODES30
0664  REF   7 LAST 123    12,2662  1 2340 0           TCF   NXTIFAIL
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 22 S3 E6

P0665 PROGRAM NAME: IMUCAGE.

R0666 FUNCTIONAL DESCRIPTION: THIS PROGRAM PROCESSES CHANGES OF THE IMUCAGE INBIT, CHANNEL 30 BIT 11. IF THE BIT
R0668 CHANGES TO 0 (CAGE BUTTON PRESSED), THE ISS IS CAGED (ICDU ZERO + COARSE ALIGN + NO ATT LAMP) UNTIL THE
R0670 ASTRONAUT SELECTS ANOTHER PROGRAM TO ALIGN THE ISS. ANY PULSE TRAINS TO THE ICDU'S AND GYRO'S ARE TERMINATED,
R0672 THE ASSOCIATED OUTCOUNTERS ARE ZEROED AND THE GYRO'S ARE DE-SELECTED. NO ACTION OCCURS WHEN THE BUTTON IS
R0674 RELEASED (INBIT CHANGES TO 1).

R0675 CALLING SEQUENCE: BY IMUMON WHEN IMU CAGE BIT CHANGES.

R0676 JOBS OR TASKS INITIATED: NONE.

R0677 SUBROUTINES CALLED: CAGESUB.

R0678 ERASABLE INITIALIZATION: FRESH START AND RESTART SET BIT 11 OF IMODES30 TO 1.

R0680 ALARMS: NONE.

R0681 EXIT: NXTIFAIL.

R0682 OUTPUT: ISS CAGED, COUNTERS ZEROED, PULSE TRAINS TERMINATED AND NO ATT LAMP LIT.

```
0684  REF  43 LAST 123   12,2663  10 000 0  IMUCAGE  CCS     A              NO ACTION IF GOING OFF.
0685  REF   8 LAST 124   12,2664  1 2340 0           TCF     NXTIFAIL

0686  REF   1            12,2665  4 3047 0          CS      OCT71000       TERMINATE ICDU AND GYRO PULSE TRAINS.
0687                     12,2666  0 0006 1          EXTEND
0688                     12,2667  03 014 1          MAND    14

0689  REF   2 LAST 115   12,2670  0 3002 0          TC      CAGESUB

0690  REF  23 LAST 121   12,2671  4 7767 1          CS      ZERO           ZERO COMMAND OUT-COUNTERS
0691  REF   1            12,2672  54 050 0          TS      CDUXCMD
0692  REF   1            12,2673  54 051 1          TS      CDUYCMD
0693  REF   1            12,2674  54 052 1          TS      CDUZCMD
0694  REF   1            12,2675  54 047 0          TS      GYROCMD

0695  REF   1            12,2676  4 3046 1          CS      OCT1700        HAVING WAITED AT LEAST 27 MCT FROM
0696                     12,2677  0 0006 1          EXTEND                 GYRO PULSE TRAIN TERMINATION, WE CAN
0697                     12,2700  03 014 1          MAND    14             DE-SELECT THE GYROS.

0698  REF   9 LAST 125   12,2701  1 2340 0          TCF     NXTIFAIL
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 23 S3 E6

P0699 PROGRAM NAME: IMUOP.

R0700 FUNCTIONAL DESCRIPTION: THIS PROGRAM PROCESSES CHANGES IN THE ISS OPERATE DISCRETE, BIT 9 OF CHANNEL 30.
R0702 IF THE INBIT CHANGES TO 0, INDICATING ISS ON, IMUOP GENERALLY SETS BIT 7 OF IMODES30 TO 1 TO REQUEST ISS
R0704 INITIALIZATION VIA TVONTEST. AN EXCEPTION IS DURING A FAILED ISS DELAY DURING WHICH BIT 2 OF IMODES30 IS SET
R0706 TO 1 AND NO FURTHER INITIALIZATION IS REQUIRED. WHEN THE INBIT CHANGES TO 1, INDICATING ISS OFF, IMUSEFLG IS
R0708 TESTED TO SEE IF ANY PROGRAM WAS USING THE ISS. IF SO, PROGRAM ALARM 00214 IS ISSUED.

R0710 CALLING SEQUENCE: BY IMUMON WHEN BIT 9 OF CHANNEL 30 CHANGES.

R0711 JOBS OR TASKS INITIATED: NONE.

R0712 SUBROUTINES CALLED: ALARM, IF ISS IS TURNED OFF WHILE IN USE.

R0713 ERASABLE INITIALIZATION: ON FRESH START AND RESTART, BIT 9 OF IMODES30 IS SET TO 1 EXCEPT WHEN THE GIMBAL LOCK
R0715 LAMP IS ON, IN WHICH CASE IT IS SET TO 0. THIS PREVENTS ICDU ZERO BY TVONTEST WITH THE ISS IN GIMBAL LOCK.

R0717 ALARMS: PROGRAM ALARM 00214 IF THE ISS IS TURNED OFF WHILE IN USE.

R0718 EXIT: NXTIFAIL.

R0719 OUTPUT: ISS INITIALIZATION REQUEST (IMODES30 BIT 7) OR PROGRAM ALARM 00214.

```
0721                        12,2702  0 0006 1  IMUOP    EXTEND
0722  REF   1              12,2703  1 2713 1           BZF     IMUOP2

0723  REF  12 LAST 117     12,2704  4 0074 0           CS      STATE       IF GOING OFF, ALARM IF PROG USING IMU.
0724  REF   4 LAST 117     12,2705  7 7754 1           MASK    IMUSEFLG
0725  REF  44 LAST 125     12,2706  10 000 0           CCS     A
0726  REF  10 LAST 125     12,2707  1 2340 0           TCF     NXTIFAIL

0727  REF   7 LAST 123     12,2710  0 4755 1           TC      ALARM
0728                        12,2711   00214 0          OCT     214
0729  REF  11 LAST 126     12,2712  1 2340 0           TCF     NXTIFAIL

0730  REF   8 LAST 123     12,2713  3 7762 0  IMUOP2   CAF     BIT2        SEE IF FAILED ISS TURN-ON SEQ IN PROG.
0731  REF  26 LAST 124     12,2714  7 0365 0           MASK    IMODES30
0732  REF  45 LAST 126     12,2715  10 000 0           CCS     A
0733  REF  12 LAST 126     12,2716  1 2340 0           TCF     NXTIFAIL    IF SO, DONT PROCESS UNTIL PRESENT 90
0734  REF   2 LAST 123     12,2717  1 2656 1           TCF     ITURNON2    SECONDS EXPIRES.
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 24 S3 E6

P0735 PROGRAM NAME: PIPFAIL

R0736 FUNCTIONAL DESCRIPTION: THIS PROGRAM PROCESSES CHANGES OF BIT 13 OF CHANNEL 33, PIPA FAIL. IT SETS BIT 10 OF
R0738 IMODE30 TO AGREE. IT CALLS SETISSW IN CASE A PIPA FAIL NECESSITATES AN ISS WARNING. IF NOT,I.E., IMODE30
R0740 BIT 1 = 1, AND A PIPA FAIL IS PRESENT AND THE ISS IS NOT BEING INITIALIZED, PROGRAM ALARM 00212 IS ISSUED.

R0742 CALLING SEQUENCE: BY C33TEST ON CHANGES OF CHANNEL 33 BIT 13.

R0743 JOBS OR TASKS INITIATED: NONE.

R0744 SUBROUTINES CALLED: 1) SETISSW, AND 2) ALARM (SEE FUNCTIONAL DESCRIPTION).

R0746 ERASABLE INITIALIZATION: SEE IMUMON FOR INITIALIZATION OF IMODE30. THE RELAVANT BITS ARE 5, 7, 8, 9, AND 10.

R0748 ALARMS: PROGRAM ALARM 00212 IF PIPA FAIL IS PRESENT BUT NEITHER ISS WARNING IS TO BE ISSUED NOR THE ISS IS
R0750 BEING INITIALIZED.

R0751 EXIT: NXTFL33.

R0752 OUTPUT: PROGRAM ALARM 00212 AND ISS WARNING MAINTENANCE.

```
0753  REF  46 LAST 126   12,2720  10 000 0  PIPFAIL  CCS    A          SET BIT10 IN IMODE30 SO ALL ISS WARNING
0754  REF   3 LAST  89   12,2721  3 7752 0            CAF    BIT10      INFO IS IN ONE REGISTER.
0755  REF  27 LAST 126   12,2722  56 365 1            XCH    IMODE30
0756  REF   1            12,2723  7 3051 1            MASK   -BIT10
0757  REF  28 LAST 127   12,2724  26 365 0            ADS    IMODE30

0758  REF   2 LAST 116   12,2725  0 2753 1            TC     SETISSW

0759  REF  29 LAST 127   12,2726  4 0365 0            CS     IMODE30    IF PIP FAIL DOESNT LIGHT ISS WARNING, DO
0760  REF   1            12,2727  7 7763 0            MASK   BIT1       A PROGRAM ALARM IF IMU OPERATING BUT NOT
0761  REF  47 LAST 127   12,2730  10 000 0            CCS    A          CAGED OR BEING TURNED ON.
0762  REF   1            12,2731  1 2535 1            TCF    NXTFL33

0763  REF  30 LAST 127   12,2732  3 0365 1            CA     IMODE30
0764  REF   1            12,2733  7 3045 1            MASK   OCT1720
0765  REF  48 LAST 127   12,2734  10 000 0            CCS    A
0766  REF   2 LAST 127   12,2735  1 2535 1            TCF    NXTFL33    ABOVE CONDITION NOT MET.

0767  REF   8 LAST 126   12,2736  0 4755 1            TC     ALARM
0768                     12,2737   00212 0            OCT    212
0769  REF   3 LAST 127   12,2740  1 2535 1            TCF    NXTFL33
```

L T4RUPT PROGRAM USER'S OWN PAGE NO. 25 S3 E6

P0770 PROGRAM NAMES: DNTMFAST, UPTMFAST

R0771 FUNCTIONAL DESCRIPTION: THESE PROGRAMS PROCESS CHANGES OF BITS 12 AND 11 OF CHANNEL 33. IF A BIT CHANGES TO A
R0773 0, A PROGRAM ALARM IS ISSUED. THE ALARMS ARE:

	BIT	ALARM	CAUSE
R0774			
R0775	---	-----	-----
R0776	12	01105	DOWNLINK TOO FAST
R0777	11	01106	UPLINK TOO FAST

R0778 CALLING SEQUENCE: BY C33TEST ON A BIT CHANGE.

R0779 SUBROUTINES CALLED: ALARM, IF A BIT CHANGES TO A 0.

R0780 ERASABLE INITIALIZATION: FRESH START OR RESTART, BITS 12 AND 11 OF IMODES33 ARE SET TO 1.

R0782 ALARMS: SEE FUNCTIONAL DESCRIPTION.

R0783 EXIT: NXTFL33.

R0784 OUTPUT: PROGRAM ALARM ON A BIT CHANGE TO 0.

```
0785  REF  49 LAST 127    12,2741  10 000 0  DNTMFAST CCS   A        DO PROG ALARM IF TM TOO FAST.
0786  REF   4 LAST 127    12,2742  1 2535 1           TCF   NXTFL33

0787  REF   9 LAST 127    12,2743  0 4755 1           TC    ALARM
0788                      12,2744   01105 1           OCT   1105
0789  REF   5 LAST 128    12,2745  1 2535 1           TCF   NXTFL33

0790  REF  50 LAST 128    12,2746  10 000 0  UPTMFAST CCS   A        SAME AS DNLINK TOO FAST WITH DIFFERENT
0791  REF   6 LAST 128    12,2747  1 2535 1           TCF   NXTFL33  ALARM CODE.

0792  REF  10 LAST 128    12,2750  0 4755 1           TC    ALARM
0793                      12,2751   01106 1           OCT   1106
0794  REF   7 LAST 128    12,2752  1 2535 1           TCF   NXTFL33
```

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P0795 PROGRAM NAME: SETISSW

R0796 FUNCTIONAL DESCRIPTION: THIS PROGRAM TURNS THE ISS WARNING LAMP ON AND OFF (CHANNEL 11 BIT 1 = 1 FOR ON,
R0798 0 FOR OFF) DEPENDING ON THE STATUS OF IMODES30 BITS 13 (IMU FAIL) AND 4 (INHIBIT IMU FAIL), 12 (ICDU FAIL) AND
R0800 3 (INHIBIT ICDU FAIL), AND 10 (PIPA FAIL) AND 1 (INHIBIT PIPA FAIL). THE LAMP IS LEFT ON IF A LAMP TEST IS IN
R0802 PROGRESS.

R0803 CALLING SEQUENCE: CALLED BY IMUMON ON CHANGES TO IMU FAIL AND ICDU FAIL. CALLED BY IFAILOK AND PFAILOK UPON
R0805 REMOVAL OF THE FAIL INHIBITS. CALLED BY PIPFAIL WHEN THE PIPA FAIL DISCRETE CHANGES. IT IS CALLED BY PIPUSE
R0807 SINCE THE PIPA FAIL PROGRAM ALARM MAY NECESSITATE AN ISS WARNING, AND LIKEWISE BY PIPFREE WHEN THE ALARM DEPARTS
R0809 AND IT IS CALLED BY IMUZERO3 AND ISSUP AFTER THE FAIL INHIBITS HAVE BEEN REMOVED.

R0811 JOBS OR TASKS INITIATED: NONE.

R0812 SUBROUTINES CALLED: NONE.

R0813 ERASABLE INITIALIZATION:

R0814 1) IMODES30 = SEE IMUMON.
R0815 2) IMODES33 BIT 1 = 0 (LAMP TEST NOT IN PROGRESS).

R0816 ALARMS: ISS WARNING.

R0817 EXIT: VIA Q.

R0818 OUTPUT: ISS WARNING LAMP SET PROPERLY.

```
0819  REF   1              12,2753  3 3037 0  SETISSW  CAF     OCT15          SET ISS WARNING USING THE FAIL BITS IN
0820  REF  31 LAST 127     12,2754  7 0365 0           MASK    IMODES30       BITS 13, 12, AND 10 OF IMODES30 AND THE
0821                       12,2755  0 0006 1           EXTEND                 FAILURE INHIBIT BITS IN POSITIONS
0822  REF   4 LAST 127     12,2756  7 7752 1           MP      BIT10          4, 3, AND 1.
0823  REF  32 LAST 129     12,2757  3 0365 1           CA      IMODES30
0824                       12,2760  0 0006 1           EXTEND
0825  REF  21 LAST 118     12,2761  04 001 1           ROR     L              0 INDICATES FAILURE.
0826                       12,2762  4 0000 0           COM
0827  REF   1              12,2763  7 5641 0           MASK    OCT15000
0828  REF  51 LAST 128     12,2764  10 000 0           CCS     A
0829  REF   1              12,2765  1 2776 1           TCF     ISSWON         FAILURE.

0830  REF   2 LAST 127     12,2766  3 7763 1  ISSWOFF  CAF     BIT1           DONT TURN OFF ISS WARNING IF LAMP TEST
0831  REF   6 LAST 119     12,2767  7 0366 0           MASK    IMODES33       IN PROGRESS.
0832  REF  52 LAST 129     12,2770  10 000 0           CCS     A
0833  REF  22 LAST 111     12,2771  0 0002 0           TC      Q

0834  REF   3 LAST 129     12,2772  4 7763 0           CS      BIT1
0835                       12,2773  0 0006 1           EXTEND
0836                       12,2774  03 011 1           WAND    11
0837  REF  23 LAST 129     12,2775  0 0002 0           TC      Q

0838  REF   4 LAST 129     12,2776  3 7763 1  ISSWON   CAF     BIT1
```

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```
0839                        12,2777  0 0006 1          EXTEND
0840                        12,3000  05 011 1          WOR     11
0841  REF  24 LAST 129     12,3001  0 0002 0          TC      Q

0842  REF   1               12,3002  4 3050 0  CAGESUB  CS      BITS&615      SET OUTBITS AND INTERNAL FLAGS FOR
0843                        12,3003  0 0006 1          EXTEND                  SYSTEM TURN-ON OR CAGE. DISABLE THE
0844                        12,3004  03 012 1          WAND    12              ERROR COUNTER AND REMOVE IMU DELAY COMP.
0845  REF   2 LAST 116     12,3005  3 3041 1          CAF     BITS&65       SEND ZERO AND COARSE.
0846                        12,3006  0 0006 1          EXTEND
0847                        12,3007  05 012 1          WOR     12

0848  REF   1               12,3010  4 3040 1          CS      OC40ñ10       TURN ON NO ATT LAMP.
0849  REF  15 LAST 121      12,3011  7 0326 1          MASK    DSPTAB +11D
0850  REF   2 LAST 130      12,3012  6 3040 0          AD      OC40ñ10
0851  REF  16 LAST 130      12,3013  54 326 1          TS      DSPTAB +11D

0852  REF   1               12,3014  4 3043 1  CAGESUB2 CS      OCT75         SET FLAGS TO INDICATE CAGING OR TURN-ON,
0853  REF  33 LAST 129      12,3015  7 0365 0          MASK    IMODES30      AND TO INHIBIT ALL ISS WARNING INFO.
0854  REF   2 LAST 130      12,3016  6 3043 0          AD      OCT75
0855  REF  34 LAST 130      12,3017  54 365 0          TS      IMODES30

0859  REF  25 LAST 130      12,3020  0 0002 0          TC      Q

0862  REF   3 LAST 127                12,2753  IMUFAIL  EQUALS SETISSW
0863  REF   4 LAST 130                12,2753  ICDUFAIL EQUALS SETISSW
```

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P0864 JUMP TABLES AND CONSTANTS.

0865	REF	1		12,3021	1 2633 1	IFAILJMP	TCF	ITURNON	CHANNEL 30 DISPATCH.
0866	REF	1		12,3022	1 2753 0		TCF	IMUFAIL	
0867	REF	1		12,3023	1 2753 0		TCF	ICDUFAIL	
0868	REF	1		12,3024	1 2663 1		TCF	IMUCAGE	
0869				12,3025	76400 1	30RDMSK	OCT	76400	(BIT 10 NOT SAMPLED HERE).
0870	REF	1		12,3026	1 2702 1		TCF	IMUOP	
0871	REF	1		12,3027	1 2720 1	C33JMP	TCF	PIPFAIL	CHANNEL 33 DISPATCH.
0872	REF	1		12,3030	1 2741 0		TCF	DNTMEAST	
0873	REF	1		12,3031	1 2746 1		TCF	UPTMEAST	

R0874 SUBROUTINE TO SKIP IF LAMP TEST NOT IN PROGRESS.

0875	REF	7 LAST 129		12,3032	4 0366 0	LAMPTEST	CS	IMODES33	BIT 1 OF IMODES33 = 1 IF LAMP TEST IN
0876	REF	5 LAST 129		12,3033	7 7763 0		MASK	BIT1	PROGRESS.
0877	REF	53 LAST 129		12,3034	10 000 0		CCS	A	
0878	REF	26 LAST 130		12,3035	24 002 0		INCR	Q	
0879	REF	27 LAST 131		12,3036	0 0002 0		TC	Q	
0880	REF	1			5642	33RDMSK	EQUALS	PRIO16	
0881				12,3037	00015 0	OCT15	OCT	15	
0882				12,3040	40010 1	OCT40010	OCT	40010	
0883				12,3041	00030 1	BITS4&5	OCT	30	
0884				12,3042	00054 0	OCT54	OCT	54	
0885				12,3043	00075 0	OCT75	OCT	75	
0886				12,3044	00300 1	BITS7&8	OCT	300	
0887				12,3045	01720 0	OCT1720	OCT	1720	
0888				12,3046	01700 1	OCT1700	OCT	1700	
0889	REF	1			5641	OCT15000	EQUALS	PRIO15	
0890				12,3047	71000 1	OCT71000	OCT	71000	
0891				12,3050	40040 1	BITS6&15	OCT	40040	
0892				12,3051	76777 1	-BIT10	OCT	-1000	
0893				12,3052	21450 0	90SECS	DEC	9000	
0894				12,3053	00014 1	120MS	DEC	12	
0895	REF	4 LAST 111			5733	GLOCKOK	EQUALS	RESUME	

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```
P0897          RR INBIT MONITOR.

 0898  REF   3 LAST  98     12,3054  3 0412 0  RRAUTCHK  CA      RADMODES      SEE IF CHANGE IN RR AUTO MODE BIT.
 0899                       12,3055  0 0006 1           EXTEND
 0900                       12,3056  06 033 1           RXOR    33
 0901  REF   9 LAST 126     12,3057  7 7762 1           MASK    BIT2
 0902                       12,3060  0 0006 1           EXTEND
 0903  REF   1              12,3061  1 3115 0           BZF     RRCDUCHK

 0904  REF   4 LAST 132     12,3062  22 412 0           LXCH    RADMODES      UPDATE RADMODES.
 0905                       12,3063  0 0006 1           EXTEND
 0906  REF  22 LAST 129     12,3064  06 001 0           RXOR    L
 0907  REF   5 LAST 132     12,3065  54 412 1           TS      RADMODES
 0908  REF  10 LAST 132     12,3066  7 7762 1           MASK    BIT2          SEE IF JUST ON.
 0909  REF  54 LAST 131     12,3067  10 000 0           CCS     A
 0910  REF   1              12,3070  1 3107 0           TCF     RROFF         OFF.

 0911  REF   5 LAST 124     12,3071  3 7755 1           CAF     BIT7          IF JUST ON AND SOME PROGRAM IS USING THE
 0912  REF  13 LAST 126     12,3072  7 0074 0           MASK    STATE         RR, DONT ZERO THE CDUS.
 0913  REF  55 LAST 132     12,3073  10 000 0           CCS     A
 0914  REF   2 LAST 132     12,3074  1 3115 0           TCF     RRCDUCHK

 0915  REF   1              12,3075  4 3106 1           CS      OCT10001      SET BITS TO INDICATE ZERO AND TURNON
 0916  REF   6 LAST 132     12,3076  7 0412 1           MASK    RADMODES      IN PROGRESS.
 0917  REF   2 LAST 132     12,3077  6 3106 0           AD      OCT10001
 0918  REF   7 LAST 132     12,3100  54 412 1           TS      RADMODES

 0919  REF  15 LAST 119     12,3101  3 7763 1           CAF     ONE
 0920  REF   7 LAST 117     12,3102  0 5663 1           TC      WAITLIST
 0921  REF   7 LAST 117                   E6           EBANK=  M11
 0922                       12,3103   02000 0           2CADR   RRTURNON
C0922  REF   1              12,3104   20066 0
 0923  REF   3 LAST 108     12,3105  1 3161 0           TCF     NORRGMON

 0924                       12,3106   10001 1  OCT10001 OCT     10001

 0925  REF  14 LAST 132     12,3107  4 0074 0  RROFF    CS      STATE         IF SOMEONE WAS USING THE RR, DISPLAY AN
 0926  REF   6 LAST 132     12,3110  7 7755 0           MASK    BIT7          ALARM IF THE RR GOES OUT OF AUTO MODE.
 0927  REF  56 LAST 132     12,3111  10 000 0           CCS     A
 0928  REF   3 LAST 132     12,3112  1 3115 0           TCF     RRCDUCHK

 0929  REF  11 LAST 128     12,3113  0 4755 1           TC      ALARM
 0930                       12,3114   00514 1           OCT     514
```

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P0931 CHECK FOR RR CDU FAIL.

```
0932  REF   8 LAST 132   12,3115  3 0412 0  RRCDUCHK  CA     RADMODES     LAST SAMPLED BIT IN RADMODES.
0933                     12,3116  0 0006 1            EXTEND
0934                     12,3117  06 030 1            RXOR   30
0935  REF   7 LAST 132   12,3120  7 7755 0            MASK   BIT7
0936                     12,3121  0 0006 1            EXTEND
0937  REF   1            12,3122  1 3135 1            BZF    RRGIMON

0938  REF  11 LAST 132   12,3123  3 7762 0            CAF    BIT2         IF RR NOT IN AUTO MODE, DONT CHANGE BIT
0939  REF   9 LAST 133   12,3124  7 0412 1            MASK   RADMODES     7 OF RADMODES. IF THIS WERE NOT DONE,
0940  REF  57 LAST 132   12,3125  10 000 0            CCS    A            THE TRACKER FAIL MIGHT COME ON WHEN
0941  REF   4 LAST 132   12,3126  1 3161 0            TCF    NORRGMON     JUST READING LR DATA.

0942  REF   8 LAST 133   12,3127  3 7755 1            CAF    BIT7         SET BIT 7 OF RADMODES FOR SETTRKF.
0943  REF  10 LAST 133   12,3130  22 412 0            XCH    RADMODES     UPDATE RADMODES.
0944                     12,3131  0 0006 1            EXTEND
0945  REF  23 LAST 132   12,3132  06 001 0            RXOR   L
0946  REF  11 LAST 133   12,3133  54 412 1            TS     RADMODES

0947  REF   1            12,3134  0 4377 0  TRKFLCDU  TC     SETTRKF      UPDATE TRACKER FAIL LAMP ON DSKY.
```

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```
P0948           THE RR GIMBAL LIMIT MONITOR IS ENABLED WHENEVER THE RR IS IN THE AUTO MODE EXCEPT WHEN THE RR CDUS ARE
R0950   BEING ZEROED, OR DURING A REMODE OR MONITOR REPOSITION OPERATION. THE LATTER IS INITIATED BY THIS MONITOR WHEN
R0952   THE GIMBALS EXCEED THE LIMITS FOR THE CURRENT MODE. A ROUTINE IS INITIATED TO DRIVE THE GIMBALS TO T = 0 AND
R0954   S = 0 IF IN MODE 1 AND T = 180 WITH S = -90 FOR MODE 2.

 0955   REF   1                 12,3135  3 3157 1  RRGIMON  CAF     OCT32002        INHIBITED BY REMODE, ZEROING, MONITOR,
 0956   REF  12 LAST 133        12,3136  7 0412 1           MASK    RADMODES        OR RR NOT IN AUTO.
 0957   REF  58 LAST 133        12,3137  10 000 0           CCS     A
 0958   REF   5 LAST 133        12,3140  1 3161 0           TCF     NORRGMON

 0959   REF   1                 12,3141  0 4334 1           TC      RRLIMCHK        SEE IF ANGLES IN LIMITS.
 0960   REF   1                 12,3142   00035 1           ADRES   OPTY

 0961   REF   1                 12,3143  1 3145 0           TCF     MONREPOS

 0962   REF   6 LAST 134        12,3144  1 3161 0           TCF     NORRGMON        (ADDITIONAL CODING MAY GO HERE).

 0963   REF   2 LAST 116        12,3145  3 7751 0  MONREPOS CAF     BIT11           SET FLAG TO SHOW REPOSITION IN PROGRESS.
 0964   REF  13 LAST 134        12,3146  26 412 1           ADS     RADMODES

 0965   REF   1                 12,3147  4 3160 1           CS      OCT20002        DISABLE TRACKER AND ERROR COUNTER.
 0966                           12,3150  0 0006 1           EXTEND
 0967                           12,3151  03 012 1           WAND    12

 0968   REF   4 LAST  88        12,3152  3 7762 0           CAF     TWO
 0969   REF   8 LAST 132        12,3153  0 5663 1           TC      WAITLIST
 0970   REF   8 LAST 132                     E6            EBANK=  M11
 0971                           12,3154   02051 1           2CADR   DORREPOS
C0971   REF   1                 12,3155   20066 0
 0972   REF   7 LAST 134        12,3156  1 3161 0           TCF     NORRGMON

 0973                           12,3157   32002 1  OCT32002 OCT     32002
 0974                           12,3160   20002 1  OCT20002 OCT     20002
```

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P0975 PROGRAM NAME: GPMATRIX (DAPT4S) MOD. NO. 2 DATE: OCTOBER 27, 1966

R0976 AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0977 THIS PROGRAM CALCULATES ALL THE SINGLE-PRECISION MATRIX ELEMENTS WHICH ARE USED BY LEM DAP TO TRANSFORM VECTORS
R0979 FROM GIMBAL TO PILOT (BODY) AXES AND BACK AGAIN. THESE ELEMENTS ARE USED EXCLUSIVELY BY BASIC LANGUAGE ROUTINES
R0981 AND THEREFORE ARE NOT ARRAYED FOR USE BY INTERPRETIVE PROGRAMS.

R0982 CALLING SEQUENCE: GPMATRIX IS TRANSFERRED TO FROM DAPT4S AND IS THUS EXECUTED 4 TIMES A SECOND BY T4RUPT.
R0984 DAPT4S IS LISTED IN T4JUMP TABLE TWICE EXPLICITLY AND ALSO OCCURS AFTER RRAUTCHK (WHICH IS ALSO LISTED TWICE).

R0986 SUBROUTINES CALLED: SPSIN, SPCOS.

R0987 NORMAL EXIT: RESUME.

R0988 ALARM/ABORT MODE: THERE ARE NO REAL ALARMS OR ABORTS. HOWEVER, WHEN THE MIDDLE GIMBAL ANGLE NEARS GIMBAL LOCK,
R0990 A DIVISION BY COS(MG) WILL CAUSE OVERFLOW (I.E. A BAD QUOTIENT). THIS CONDITION IS PREVENTED BY TESTING COS(MG)
R0992 AND SUBSTITUTING POSMAX/NEGMAX FOR THE INCALCULABLE QUANTITIES.

R0993 INPUT: CDUX,CDUY,CDUZ. OUTPUT: M11,M21,M31,M22,M32,MR12,MR13,
R0994 (ALSO MR22=M22,MR23=M32)

R0995 AOG = CDUX, AIG = CDUY, AMG = CDUZ; MNEMONIC IS: DIM = XYZ

R0996 * * SIN(MG) 0 1 *
R0997 M = * COS(MG)COS(OG) SIN(OG) 0 *
R0998 GPI * -COS(MG)SIN(OG) COS(OG) 0 *

R0999 * * 0 COS(OG)/COS(MG) -SIN(OG)/COS(MG) *
R1000 M = * 0 SIN(OG) COS(OG) *
R1001 PG * 1 -SIN(MG)COS(OG)/COS(MG) SIN(MG)SIN(OG)/COS(MG) *

R1002 THIS CODING TRANSFERS CONTROL TO THE DAP FIXED BANK FOR GPMATRIX:

```
 1003                                  12,3161          BANK   12
10031  REF   9 LAST 134                   E6           EBANK= M11

 1004                          12,3161  0 0006 1  DAPT4S  EXTEND                 GET 2CADR OF GPMATRIX
 1005  REF   1                 12,3162  3 3165 0          DCA    DAPT4
 1006                          12,3163  52 006 0          DTCB                   CROSS BANKS

10065  REF   3 LAST 108               12,3161  NORRGMON EQUALS DAPT4S

 1007  REF  10 LAST 135                   E6           EBANK= M11
 1008                          12,3164  02000 0  DAPT4   2CADR  GPMATRIX
C1008  REF   1                 12,3165  40066 0
```

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P1009 T4RUPT DAP LOGIC:

```
1010                                    20,2000          BANK   20
10101  REF  11 LAST 135                    E6           EBANK= M11

1011   REF   2 LAST 120     20,2000  30 034 0  GPMATRIX  CAE    CDUZ        SINGLE ENTRY POINT
1012   REF   1              20,2001  0 5355 1            TC     SPSIN       SIN(CDUZ) = SIN(MG)
1013   REF  12 LAST 136     20,2002  55'404 1            TS     M11         SCALED AT 1

1014   REF   3 LAST 136     20,2003  30 034 0            CAE    CDUZ
1015   REF   1              20,2004  0 5354 0            TC     SPCOS       COS(CDUZ) = COS(MG)
1016   REF   1              20,2005  55'457 1            TS     COSMG       SCALED AT 1 (ONLY A FACTOR)

1017   REF   1              20,2006  30 032 0            CAE    CDUX
1018   REF   2 LAST 136     20,2007  0 5355 1            TC     SPSIN       SIN(CDUX) = SIN(OG)
1019   REF   1              20,2010  55'401 1            TS     M22         SCALED AT 1 (ALSO IS MR22)

1020   REF   2 LAST 136     20,2011  4 1401 1            CS     M22
1021                        20,2012  0 0006 1            EXTEND
1022   REF   2 LAST 136     20,2013  7 1457 1            MP     COSMG       -SIN(OG)COS(MG)
1023   REF   1              20,2014  55'406 0            TS     M31         SCALED AT 1

1024   REF   2 LAST 136     20,2015  30 032 0            CAE    CDUX
1025   REF   2 LAST 136     20,2016  0 5354 0            TC     SPCOS       COS(CDUX) = COS(OG)
1026   REF   1              20,2017  55'403 0            TS     M32         SCALED AT 1 (ALSO IS MR23)

1027                        20,2020  0 0006 1            EXTEND
1028   REF   3 LAST 136     20,2021  7 1457 1            MP     COSMG       COS(OG)COS(MG)
1029   REF   1              20,2022  55'405 0            TS     M21         SCALED AT 1

1030   REF   4 LAST 136     20,2023  4 1457 1            CS     COSMG       CHECK FOR CDUZ GREATER THAN 60 DEGREES.
1031   REF   7 LAST 123     20,2024  6 7746 0            AD     BIT14
1032                        20,2025  0 0006 1            EXTEND
1033                        20,2026  6 2031 1            BZMF   +3
10332  REF   8 LAST 136     20,2027  3 7746 0            CAF    BIT14       USE 60 DEG. FOR CDUZ=HENCE COS(CDJZ)=1/2
10334  REF   5 LAST 136     20,2030  55'457 1            TS     COSMG       (SINMG NOT SIMILARLY LIMITED)
1034   REF   2 LAST 136     20,2031  31'403 1  +3        CAE    M32
1035                        20,2032  0 0006 1            EXTEND
1036   REF   9 LAST 136     20,2033  7 7746 1            MP     BIT14       SCALE FOR DIVISION
1037                        20,2034  0 0006 1            EXTEND
1038   REF   6 LAST 136     20,2035  11'457 1            DV     COSMG       COS(OG)/COS(MG)
1039   REF   1              20,2036  55'400 0            TS     MR12        SCALED AT 2

1040   REF   3 LAST 136     20,2037  4 1401 1            CS     M22
1041                        20,2040  0 0006 1            EXTEND
1042   REF  10 LAST 136     20,2041  7 7746 1            MP     BIT14       SCALE FOR DIVISION
1043                        20,2042  0 0006 1            EXTEND
1044   REF   7 LAST 136     20,2043  11'457 1            DV     COSMG       -SIN(OG)/COS(MG)
1045   REF   1              20,2044  55'402 1            TS     MR13        SCALED AT 2
1046   REF   5 LAST 131     20,2045  1 5733 1            TCF    RESUME
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 1 S3

```
0001                                    4314            BLOCK  02
0002  REF   1                           E3              EBANK= COMMAND

R0003           FIXED-FIXED ROUTINES.

0004  REF  24 LAST 125          4314  3 7767 0  ZEROICDU CAF    ZERO     ZERO ICDU COUNTERS.
0005  REF   3 LAST 136          4315  54 032 1            TS     CDUX
0006  REF   1                   4316  54 033 0            TS     CDUY
0007  REF   4 LAST 136          4317  54 034 1            TS     CDUZ
0008  REF  28 LAST 131          4320  0 0002 0            TC     Q

00085                           4321   00620 0  4SECS     DEC    400
0009                            4322   00454 1  3SECS     DEC    300
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 2 S3 E3

P0011 IMU ZEROING ROUTINE.

```
0012                                    13,2000          BANK    13

0013                                    13,2000  0 0004 0  IMUZERO  INHINT
00131  REF  17 LAST 130                 13,2001  4 0326 1          CS      DSPTAB +11D     DONT ZERO CDUS IF IMU IN GIMBAL LOCK AND
00132  REF   1                         13,2002  7 2777 0          MASK    BITS466         COARSE ALIGN.
00133  REF  59 LAST 134                13,2003  10 000 0          CCS     A
00134  REF   1                         13,2004  1 2010 0          TCF     IMUZEROA

00135  REF  12 LAST 132                 13,2005  0 4755 1          TC      ALARM           IF SO.
00136                                   13,2006   00206 0          OCT     206

00137  REF   1                         13,2007  1 2712 0          TCF     CAGETSTJ +4

0014   REF   5 LAST 126                13,2010  4 7754 1  IMUZEROA CS      IMUSEFLG
0015   REF  15 LAST 132                13,2011  7 0074 0          MASK    STATE           PROGRAM IS USING THE IMU.
0016   REF   6 LAST 138                13,2012  6 7754 0          AD      IMUSEFLG
0017   REF  16 LAST 138                13,2013  54 074 0          TS      STATE

0018   REF   1                         13,2014  0 2701 0          TC      CAGETSTQ        IF IMU COMING UP, TURN-ON PROGRAM WILL
0019   REF   1                         13,2015  1 2043 0          TCF     MODEEXIT        DO ALL THE WORK.

0020   REF   1                         13,2016  4 2776 1          CS      BITS364         INHIBIT ICDUFAIL AND IMUFAIL (IN CASE WE
0021   REF  35 LAST 130                13,2017  7 0365 0          MASK    IMODFS30        JUST CAME OUT OF COARSE ALIGN).
0022   REF   2 LAST 138                13,2020  6 2776 0          AD      BITS364
0023   REF  36 LAST 138                13,2021  54 365 0          TS      IMODFS30

0024   REF   2 LAST 138                13,2022  4 2777 0          CS      BITS466         SEND ZERO ENCODE WITH COARSE AND ERROR
0025                                    13,2023  0 0006 1          EXTEND                  COUNTER DISABLED.
0026                                    13,2024  03 012 1          WAND    12

00261  REF   2 LAST 116                13,2025  0 2324 0          TC      NOATTOFF        TURN OFF NO ATT LAMP.

0027   REF   3 LAST 117                13,2026  3 7757 0          CAF     BIT5
0028                                    13,2027  0 0006 1          EXTEND
0029                                    13,2030  05 012 1          WOR     12

0030   REF   8 LAST 121                13,2031  3 7756 1          CAF     BIT6            WAIT 320 MS TO GIVE AGS ADEQUATE TIME TO
0031   REF   9 LAST 134                13,2032  0 5663 1          TC      WAITLIST        RECEIVE ITS PULSE TRAIN.
00315  REF   2 LAST 137                         E3               EBANK=  COMMAND
0032                                    13,2033   02045 1          2CADR   IMUZERO2
C0032  REF   1                         13,2034   26063 0
0033   REF  37 LAST 138                13,2035  4 0365 0          CS      IMODFS30        SEE IF IMU OPERATING AND ALARM IF NOT.
0034   REF   2 LAST 115                13,2036  7 7753 0          MASK    BIT9
0035   REF  60 LAST 138                13,2037  10 000 0          CCS     A
0036   REF   2 LAST 138                13,2040  1 2043 0          TCF     MODEEXIT

0037   REF  13 LAST 138                13,2041  0 4755 1          TC      ALARM
0038                                    13,2042   00210 1          OCT     210
```

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```
0039                        13,2043  0 0003 1  MODEEXIT RELINT          GENERAL MODE-SWITCHING EXIT.
0040   REF  2 LAST  63      13,2044  1 5221 1          TCF    SWRETURN
```

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```
0041  REF   2 LAST 138   13,2045  0 2701 0  IMUZERO2  TC      CAGETSTQ     POSSIBLY SWITCH TO TURN-ON PROGRAM.
0042  REF   4 LAST 116   13,2046  1 5727 1            TCF     TASKOVER

0043  REF   2 LAST 116   13,2047  0 4314 0            TC      ZEROICDU     ZERO COUNTERS.
0044  REF   4 LAST 138   13,2050  4 7757 1            CS      BIT5         REMOVE ZERO DISCRETE.
0045                      13,2051  0 0006 1            EXTEND
0046                      13,2052  03 012 1            WAND    12

0047  REF   2 LAST 116   13,2053  3 4321 0            CAF     4SECS
0048  REF   3 LAST 116   13,2054  0 5704 1            TC      VARDELAY

0049  REF   3 LAST 140   13,2055  0 2701 0  IMUZERO3  TC      CAGETSTQ
0050  REF   5 LAST 140   13,2056  1 5727 1            TCF     TASKOVER

0051  REF   3 LAST 138   13,2057  4 2776 1            CS      BITS364      REMOVE IMUFAIL AND ICDUFAIL INHIBIT.
0052  REF  38 LAST 138   13,2060  7 0365 0            MASK    IMODES30
0053  REF  39 LAST 140   13,2061  54 365 0            TS      IMODES30

0054  REF  12 LAST 120   13,2062  0 5270 1            TC      IBNKCALL     SET ISS WARNING IF EITHER OF ABOVE ARE
0055  REF   5 LAST 130   13,2063   24753 0            CADR    SETISSW      PRESENT.

0056  REF   2 LAST 116   13,2064  1 2664 0            TCF     ENDIMU
```

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```
P0057          IMU COARSE ALIGN MODE.

0058                                13,2065  0 0004 0  IMUCOARS INHINT
0059    REF   2 LAST 120            13,2066  0 2232 0           TC     SETCOARS

0066    REF   2 LAST 110            13,2067  3 6306 1           CAF    SIX
0067    REF  10 LAST 138            13,2070  0 5663 1           TC     WAITLIST
00675   REF   3 LAST 138                        E3               EBANK= COMMAND
0068                                13,2071    02074 0          2CADR  COARS
C0068   REF   1                     13,2072    26063 0
0069    REF   3 LAST 138            13,2073  1 2043 0           TCF    MODEEXIT

0070    REF   1                     13,2074  0 2674 0  COARS    TC     CAGETEST
0071    REF   9 LAST 138            13,2075  3 7756 1           CAF    BIT6          ENABLE ALL THREE ISS CDU ERROR COUNTERS
0072                                13,2076  0 0006 1           EXTEND
0073    REF   1                     13,2077  05 012 1           WOR    CHAN12

0074    REF   5 LAST 134            13,2100  3 7762 0           CAF    TWO           SET CDU INDICATOR
0075    REF   1                     13,2101  55'460 0  COARS1   TS     CDUIND

0076    REF   2 LAST 141            13,2102  51'460 1           INDEX  CDUIND        COMPUTE THETAD - THETAA IN 1'S
0077    REF   1                     13,2103  3 0400 0           CA     THETAD          COMPLEMENT FORM
0078                                13,2104  0 0006 1           EXTEND
0079    REF   3 LAST 141            13,2105  5 1460 1           INDEX  CDUIND
0080    REF   4 LAST 137            13,2106  20 032 1           MSU    CDUX
0081                                13,2107  0 0006 1           EXTEND
0082    REF   2 LAST 119            13,2110  7 7747 0           MP     BIT13         SHIFT RIGHT 2
0083    REF  24 LAST 133            13,2111  56 001 0           XCH    L             ROUND
0084                                13,2112  6 0000 1           DOUBLE
0085    REF  12 LAST  88            13,2113  54 061 1           TS     ITEMP1
0086                                13,2114  1 2116 1           TCF    +2
0087    REF  25 LAST 141            13,2115  26 001 1           ADS    L

0088    REF   4 LAST 141            13,2116  51'460 1           INDEX  CDUIND        DIFFERENCE TO BE COMPUTED
0089    REF   4 LAST 141            13,2117  23'455 1           LXCH   COMMAND
0090    REF   5 LAST 141            13,2120  11'460 0           CCS    CDUIND
0091    REF   1                     13,2121  0 2101 0           TC     COARS1

0092    REF   6 LAST 141            13,2122  3 7762 0           CAF    TWO           MINIMUM OF 4 MS WAIT
0093    REF   4 LAST 140            13,2123  0 5704 1           TC     VARDELAY
```

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```
0094  REF   2 LAST 141   13,2124  0 2674 0  COARS2   TC    CAGETEST    DONT CONTINUE IF CAGED.
0095  REF  13 LAST 141   13,2125  54 061 1            TS    ITEMP1      SETS TO +0.
0096  REF   7 LAST 141   13,2126  3 7762 0            CAF   TWO         SET CDU INDICATOR
0097  REF   6 LAST 141   13,2127  55'460 0  +3        TS    CDUIND

0098  REF   7 LAST 142   13,2130  51'460 1            INDEX CDUIND
0099  REF   5 LAST 141   13,2131  11'455 0            CCS   COMMAND     NUMBER OF PULSES REQUIRED
0100  REF   1           13,2132  0 2136 1            TC    COMPOS      GREATER THAN MAX ALLOWED
0101  REF   1           13,2133  0 2145 0            TC    NEXTCDU +1
0102  REF   1           13,2134  0 2211 1            TC    COMNEG
0103  REF   2 LAST 142  13,2135  0 2145 0            TC    NEXTCDU +1

0104  REF   1           13,2136  6 3002 0  COMPOS    AD    -COMMAX     COMMAX = MAX NUMBER OF PULSES ALLOWED
0105                    13,2137  0 0006 1            EXTEND            MINUS ONE
0106  REF   1           13,2140  6 2221 1            BZMF  COMZERO
0107  REF   8 LAST 142  13,2141  51'460 1            INDEX CDUIND
0108  REF   6 LAST 142  13,2142  55'455 0            TS    COMMAND     REDUCE COMMAND BY MAX NUMBER OF PULSES
0109  REF   1           13,2143  4 3003 0            CS    -COMMAX-      ALLOWED

0110  REF  14 LAST 142  13,2144  24 061 0  NEXTCDU   INCR  ITEMP1
01105 REF   2 LAST 107  13,2145  6 7770 0            AD    NEGO        PREVENT +0 IN OUTPUT COUNTER
0111  REF   9 LAST 142  13,2146  51'460 1            INDEX CDUIND
0112  REF   2 LAST 125  13,2147  54 050 0            TS    CDUXCMD     SET UP COMMAND REGISTER.

0113  REF  10 LAST 142  13,2150  11'460 0            CCS   CDUIND
0114  REF   1           13,2151  0 2127 1            TC    COARS2 +3

0115  REF  15 LAST 142  13,2152  10 061 1            CCS   ITEMP1      SEE IF ANY PULSES TO GO OUT.
0116  REF   1           13,2153  1 2225 1            TCF   SENDPULS

0117  REF   1           13,2154  0 5701 1            TC    FIXDELAY    WAIT FOR GIMBALS TO SETTLE.
0118                    13,2155   00226 1            DEC   150
```

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```
0119  REF   8 LAST 142   13,2156  3 7762 0            CAF    TWO        AT END OF COMMAND, CHECK TO SEE THAT
0120  REF  16 LAST 142   13,2157  54 061 1  CHKCORS    TS     ITEMP1     GIMBALS ARE WITHIN 2 DEGREES OF THETAD.
0121  REF  61 LAST 138   13,2160  50 000 1            INDEX  A
0122  REF   5 LAST 141   13,2161  3 0032 0            CA     CDUX
0123                     13,2162  0 0006 1            EXTEND
0124  REF  17 LAST 143   13,2163  5 0061 0            INDEX  ITEMP1
0125  REF   2 LAST 141   13,2164  20 400 1            MSU    THETAD
0126  REF  62 LAST 143   13,2165  10 000 0            CCS    A
0127  REF   1            13,2166  1 2202 1            TCF    COARSERR
0128  REF   1            13,2167  1 2171 0            TCF    CORSCHK2
0129  REF   2 LAST 143   13,2170  1 2202 1            TCF    COARSERR

0130  REF  18 LAST 143   13,2171  10 061 1  CORSCHK2   CCS    ITEMP1
0131  REF   1            13,2172  1 2157 1            TCF    CHKCORS
0132  REF   3 LAST  31   13,2173  55'455 0            TS     GCOMP      ZERO GYRO COMPENSATION REGISTERS IN
0133  REF   4 LAST 143   13,2174  55'456 0            TS     GCOMP +1   PREPARATION FOR COMPENSATION.
0134  REF   5 LAST 143   13,2175  55'457 1            TS     GCOMP +2
0135  REF   6 LAST 143   13,2176  55'460 0            TS     GCOMP +3
0136  REF   7 LAST 143   13,2177  55'461 1            TS     GCOMP +4
0137  REF   8 LAST 143   13,2200  55'462 1            TS     GCOMP +5

0138  REF   3 LAST 140   13,2201  1 2664 0            TCF    ENDIMU     END OF COARSE ALIGNMENT.

0139  REF   1            13,2202  6 2210 0  COARSERR  AD     COARSTOL   2 DEGREES.
0140                     13,2203  0 0006 1            EXTEND
0141  REF   2 LAST 143   13,2204  6 2171 1            BZMF   CORSCHK2

0142  REF  14 LAST 138   13,2205  0 4755 1            TC     ALARM      COARSE ALIGN ERROR.
0143                     13,2206   00211 0            OCT    211

0144  REF   2 LAST 116   13,2207  1 2672 1            TCF    IMJBAD

0145                     13,2210   77511 1  COARSTOL  DEC    -.01111    2 DEGREES SCALED AT HALF-REVOLUTIONS.
```

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```
0146  REF   2 LAST 142    13,2211  6 3002 0  COMNEG   AD     -COMMAX
0147                      13,2212  0 0006 1           EXTEND
0148  REF   2 LAST 142    13,2213  6 2221 1           BZMF   COMZERO
0149                      13,2214  4 0000 0           COM
0150  REF  11 LAST 142    13,2215  51'460 1           INDEX  CDUIND
0151  REF   7 LAST 142    13,2216  55'455 0           TS     COMMAND
0152  REF   2 LAST 142    13,2217  3 3003 1           CA     -COMMAX-
0153  REF   3 LAST 142    13,2220  0 2144 1           TC     NEXTCDU

0154  REF  25 LAST 137    13,2221  3 7767 0  COMZERO  CAF    ZERO
0155  REF  12 LAST 144    13,2222  51'460 1           INDEX  CDUIND
0156  REF   8 LAST 144    13,2223  57'455 1           XCH    COMMAND
0157  REF   4 LAST 144    13,2224  0 2144 1           TC     NEXTCDU

0158  REF   1             13,2225  3 3001 0  SENDPULS CAF    13,14,15
0159                      13,2226  0 0006 1           EXTEND
0160  REF   1             13,2227  05 014 1           WOR    CHAN14
0161  REF   1             13,2230  3 3004 0           CAF    600MS
0162  REF   2 LAST 142    13,2231  1 2123 1           TCF    COARS2 -1       AND THEN TO VARDELAY.
01621 REF  10 LAST 141    13,2232  4 7756 0  SETCOARS CS     BIT6            CLEAR ERROR COUNTER BEFORE MODE SWITCH.
016212                    13,2233  0 0006 1           EXTEND
016214                    13,2234  03 012 1           WAND   12
016216 REF   7 LAST 122    13,2235  3 7760 1           CAF    BIT4            PUT ISS IN COARSE ALIGN.
01622                     13,2236  0 0006 1           EXTEND
01623                     13,2237  05 012 1           WOR    12

01624 REF   1             13,2240  4 2251 1           CS     OCT40010        TURN ON NO ATT LAMP.
01625 REF  18 LAST 138    13,2241  7 0326 1           MASK   DSPTAB +11D
01626 REF   2 LAST 144    13,2242  6 2251 0           AD     OCT40010
016265 REF  19 LAST 144   13,2243  54 326 1           TS     DSPTAB +11D

01627 REF   8 LAST 144    13,2244  4 7760 0           CS     BIT4            INHIBIT IMU FAIL.
016275 REF  40 LAST 140   13,2245  7 0365 0           MASK   IMODES30
01628 REF   9 LAST 144    13,2246  6 7760 1           AD     BIT4
016285 REF  41 LAST 144   13,2247  54 365 0           TS     IMODFS30

01629 REF  29 LAST 137    13,2250  0 0002 0           TC     Q

016295                    13,2251   40010 1  OCT40010 OCT    40010
```

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P0163 IMU FINE ALIGN MODE SWITCH.

```
0164                                13,2252  0 0004 0  IMUFINE  INHINT
0165  REF  2 LAST 138               13,2253  0 2706 1           TC      CAGETSTJ      SEE IF IMU BEING CAGED.

0166  REF  1                       13,2254  4 3000 0           CS      BIT5&6        RESET ZERO, COARSE, AND ECTR ENABLE.
0167                                13,2255  0 0006 1           EXTEND
0168                                13,2256  03 012 1           WAND    12

01685 REF  3 LAST 138               13,2257  0 2324 0           TC      NOATTOFF      TURN OFF NO ATT LAMP.

0169  REF  5 LAST 129               13,2260  3 7752 0           CAF     BIT10         IMU FAIL WAS INHIBITED DURING THE
0170  REF 11 LAST 141               13,2261  0 5663 1           TC      WAITLIST      PRESUMABLY PRECEDING COARSE ALIGN. LEAVE
01705 REF  9 LAST 144                          E3                EBANK=  COMMAND
0171                                13,2262    02273 0          2CADR   IFAILOK       IT ON FOR THE FIRST 5 SECS OF FINE ALIGN
C0171 REF  2 LAST  89               13,2263    26063 0
0172  REF  3 LAST 140               13,2264  3 4321 0           CAF     4SECS         GYRO RE-CENTERING TIME.
0173  REF 12 LAST 145               13,2265  0 5663 1           TC      WAITLIST
01735 REF 10 LAST 145                          E3                EBANK=  COMMAND
0174                                13,2266    02271 1          2CADR   IMUFINED
C0174 REF  1                       13,2267    26063 0
0175  REF  4 LAST 141               13,2270  1 2043 0           TCF     MODEEXIT

0176  REF  3 LAST 142               13,2271  0 2674 0  IMUFINED TC      CAGETEST      SEE THAT NO ONE HAS CAGED THE IMU.
0177  REF  4 LAST 143               13,2272  1 2664 0           TCF     ENDIMU

0178  REF  4 LAST 140               13,2273  0 2701 0  IFAILOK  TC      CAGETSTQ      ENABLE IMU FIAL UNLESS IMU BEING CAGED.
0179  REF  6 LAST 140               13,2274  1 5727 1           TCF     TASKOVER      IT IS.

0180  REF 10 LAST 144               13,2275  3 7760 1           CAF     BIT4          DONT RESET IMU FAIL INHIBIT IF SOMEONE
0181                                13,2276  0 0006 1           EXTEND                HAS GONE INTO COARSE ALIGN.
0182                                13,2277  02 012 0           RAND    12
0183  REF 53 LAST 143               13,2300  10 000 0           CCS     A
0184  REF  7 LAST 145               13,2301  1 5727 1           TCF     TASKOVER

0185  REF 11 LAST 145               13,2302  4 7760 0           CS      BIT4
0186  REF 42 LAST 144               13,2303  7 0365 0  PFAILOK2 MASK    IMODES30
0187  REF 43 LAST 145               13,2304  54 365 0           TS      IMODES30
01871 REF 13 LAST 140               13,2305  0 5270 1           TC      IBNKCALL      THE ISS WARNING LIGHT MAY COME ON NOW
01872 REF  6 LAST 140               13,2306    24753 0          CADR    SETISSW       THAT THE INHIBIT HAS BEEN REMOVED.
0188  REF  8 LAST 145               13,2307  1 5727 1           TCF     TASKOVER

0189  REF  5 LAST 145               13,2310  0 2701 0  PFAILOK  TC      CAGETSTQ      ENABLE PIP FAIL PROG ALARM.
0190  REF  9 LAST 145               13,2311  1 5727 1           TCF     TASKOVER

01901 REF  6 LAST 145               13,2312  4 7752 1           CS      BIT10         MAKE PREVIOUS VALUE OF PIPA FAIL THE
01902 REF 44 LAST 145               13,2313  7 0365 0           MASK    IMODES30      NO FAIL STATE SO THAT IF THE FAILURE
01903 REF  7 LAST 145               13,2314  6 7752 0           AD      BIT10         INDICATION IS ON NOW, IT WILL BE PICKED
01904 REF 45 LAST 145               13,2315  54 365 0           TS      IMODES30      UP (ROUTINE DETECTS ONLY CHANGES).
```

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```
01905  REF   3 LAST 141    13,2316  4 7747 0          CS     BIT13      PIPA FAIL BIT IS KEPT IN TWO PLACES FOR
01906  REF   8 LAST 131    13,2317  7 0366 0          MASK   IMODES33
01907  REF   4 LAST 146    13,2320  6 7747 1          AD     BIT13
01908  REF   9 LAST 146    13,2321  54 366 0          TS     IMODES33

0191   REF   5 LAST 140    13,2322  4 7757 1          CS     BIT5
0192   REF   1             13,2323  1 2303 1          TCF    PFAILOK2

01921  REF   3 LAST 144    13,2324  4 2251 1  NOATTOFF CS     OCT40010   TURN OFF NO ATT LAMP.
01922  REF  20 LAST 144    13,2325  7 0326 1          MASK   DSPTAB +11D
01923  REF  11 LAST 123    13,2326  6 7745 0          AD     BIT15
01924  REF  21 LAST 146    13,2327  54 326 1          TS     DSPTAB +11D

01925  REF  30 LAST 144    13,2330  0 0002 0          TC     Q
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 11 S3 E3

P0193 ROUTINES TO INITIATE AND TERMINATE PROGRAM USE OF THE PIPAS. NO IMUSTALL REQUIRED IN EITHER CASE.

```
0195  REF   6 LAST 145   13,2331  0 2701 0  PIPUSE   TC     CAGETSTQ     DONT ENABLE PIPA FAIL IF IMU BEING CAGED
0196  REF   3 LAST 139   13,2332  1 5221 1            TCF    SWRETURN

0197                      13,2333  0 0004 0            INHINT
0198  REF  26 LAST 144   13,2334  3 7767 0            CAF    ZERO         ZERO COUNTERS.
0199  REF   1            13,2335  54 037 1            TS     PIPAX
0200  REF   1            13,2336  54 040 1            TS     PIPAY
0201  REF   1            13,2337  54 041 0            TS     PIPAZ

0202  REF   6 LAST 131   13,2340  4 7763 0            CS     BIT1         IF PIPA FAILS FROM NOW ON (UNTIL
0203  REF  46 LAST 145   13,2341  7 0365 0            MASK   IMODES30     PIPFREE), LIGHT ISS WARNING.
0204  REF  47 LAST 147   13,2342  54 365 0            TS     IMODES30

0205  REF  14 LAST 145   13,2343  0 5270 1  PIPFREE2 TC     IBNKCALL     ISS WARNING MIGHT COME ON NOW.
0206  REF   7 LAST 145   13,2344   24753 0            CADR   SETISSW      (OR GO OFF ON PIPFREE).

0207  REF   5 LAST 145   13,2345  1 2043 0            TCF    MODEEXIT

0208                      13,2346  0 0004 0  PIPFREE  INHINT              PROGRAM DONE WITH PIPAS, DONT LIGHT
0209  REF   7 LAST 147   13,2347  4 7763 0            CS     BIT1         ISS WARNING.
0210  REF  48 LAST 147   13,2350  7 0365 0            MASK   IMODES30
0211  REF   8 LAST 147   13,2351  6 7763 1            AD     BIT1
0212  REF  49 LAST 147   13,2352  54 365 0            TS     IMODES30

0213  REF   8 LAST 145   13,2353  7 7752 1            MASK   BIT10        IF PIP FAIL ON, DO PROG ALSRM AND RESET
0214  REF  54 LAST 145   13,2354  10 000 0            CCS    A            ISS WARNING.
0215  REF   6 LAST 147   13,2355  1 2043 0            TCF    MODEEXIT

0216  REF  15 LAST 143   13,2356  0 4755 1            TC     ALARM
0217                      13,2357   00212 0           OCT    212

0218                      13,2360  0 0004 0            INHINT

0219  REF   1            13,2361  1 2343 0            TCF    PIPFREE2
```

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P0220 THE FOLLOWING ROUTINE TORQUES THE IRIGS ACCORDING TO DOUBLE PRECISION INPUTS IN THE SIX REGISTERS
R0222 BEGINNING AT THE ECADR ARRIVING IN A. THE MINIMUM SIZE OF ANY PULSE TRAIN TO THE GYROS IS 1 PULSE. THE
R0224 UNSENT PORTION OF THE COMMAND IS LEFT INTACT IN THE INPUT COMMAND REGISTERS.

```
0226                                        E3          EBANK= 1400          VARIABLE, ACTUALLY.

0227  REF  37 LAST  97   13,2362  54 151 0  IMUPULSE  TS     MPAC +5         SAVE ARRIVING ECADR.
0228  REF   3 LAST 145   13,2363  0 2706 1            TC     CAGETSTJ        DONT PROCEED IF IMU BEING CAGED.

0229  REF   2 LAST  98   13,2364  10 356 0            CCS    LGYRO           SEE IF GYROS BUSY.
0230  REF   1            13,2365  0 2427 1            TC     GYROBUSY        SLEEP.

0231  REF  38 LAST 148   13,2366  54 146 0            TS     MPAC +2
0232  REF  11 LAST 144   13,2367  3 7756 1            CAF    BIT6            ENABLE THE POWER SUPPLY.
0233                     13,2370  0 0006 1            EXTEND
0234                     13,2371  05 014 1            WOR    14

0235  REF   2 LAST  89   13,2372  3 7761 0            CAF    FOUR
0236                     13,2373  0 0004 0  GWAKE2     INHINT                  (IF A JOB WAS PUT TO SLEEP, THE POWER
0237  REF  13 LAST 145   13,2374  0 5663 1            TC     WAITLIST        SUPPLY IS LEFT ON BY THE WAKING JOB).
02375 REF  11 LAST 145                 E3            EBANK= COMMAND
0238                     13,2375   02445 0           2CADR  STRTGYRO
C0238 REF   1            13,2376   26063 0

0239  REF  39 LAST 148   13,2377  3 0151 1            CA     MPAC +5         SET UP EBANK, SAVING CALLER'S EBANK FOR
0240  REF   6 LAST  96   13,2400  56 003 1            XCH    EBANK           RESTORATION ON RETURN.
0241  REF  40 LAST 148   13,2401  56 151 1            XCH    MPAC +5
0242  REF   3 LAST 148   13,2402  54 356 0            TS     LGYRO           RESERVES GYROS.
0243  REF   1            13,2403  7 4564 0            MASK   LOW8
0244  REF  19 LAST 143   13,2404  54 061 1            TS     ITEMP1

0245  REF   9 LAST 143   13,2405  3 7762 0            CAF    TWO             FORCE SIGN AGREEMENT ON INPUTS.
0246  REF  41 LAST 148   13,2406  54 147 1  GYROAGRE   TS     MPAC +3
0247                     13,2407  6 0000 1            DOUBLE
0248  REF  20 LAST 148   13,2410  6 0061 0            AD     ITEMP1
0249  REF  42 LAST 148   13,2411  54 150 1            TS     MPAC +4
0250                     13,2412  0 0006 1            EXTEND
0251  REF  55 LAST 147   13,2413  5 0000 1            INDEX  A
0252                     13,2414  3 1401 0            DCA    1400
0253  REF  43 LAST 148   13,2415  52 145 0            DXCH   MPAC
0254  REF   1            13,2416  0 7327 0            TC     TPAGREE
0255  REF  44 LAST 148   13,2417  52 145 0            DXCH   MPAC
0256  REF  45 LAST 148   13,2420  50 150 0            INDEX  MPAC +4
0257                     13,2421  53'401 1            DXCH   1400

0258  REF  46 LAST 148   13,2422  10 147 1            CCS    MPAC +3
0259  REF   1            13,2423  1 2406 0            TCF    GYROAGRE

0260  REF  47 LAST 148   13,2424  3 0151 1            CA     MPAC +5         RESTORE CALLER'S EBANK.
0261  REF   7 LAST 148   13,2425  54 003 0            TS     EBANK
0262  REF   7 LAST 147   13,2426  1 2043 0            TCF    MODEXIT
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 13 S3 E3

P0263 ROUTINES TO ALLOW TORQUING BY ONLY ONE JOB AT A TIME.

```
0264                        13,2427  0 0006 1  GYROBUSY EXTEND                SAVE RETURN 2FCADR.
0265  REF   1               13,2430  3 0124 0           DCA    BUF2
0266  REF  48 LAST 148      13,2431  52 145 0           DXCH   MPAC
0267  REF   1               13,2432  3 2444 1  REGSLEEP CAF    LGWAKE
0268  REF   1               13,2433  1 5545 1           TCF    JOBSLEEP

0269  REF   4 LAST 148      13,2434  10 356 0  GWAKE    CCS    LGYRO           WHEN AWAKENED, SEE IF GYROS STILL BUSY.
0270  REF   1               13,2435  1 2432 1           TCF    REGSLEEP        IF SO, SLEEP SOME MORE.

0271  REF  49 LAST 149      13,2436  54 146 0           TS     MPAC +2
0272                        13,2437  0 0006 1           EXTEND
0273  REF  50 LAST 149      13,2440  3 0145 1           DCA    MPAC
0274  REF   2 LAST 149      13,2441  52 124 1           DXCH   BUF2             RESTORE SWRETURN INFO.
0275  REF  16 LAST 132      13,2442  3 7763 1           CAF    ONE
0276  REF   1               13,2443  1 2373 0           TCF    GWAKE2

0277  REF   1               13,2444   26434 0  LGWAKE   CADR   GWAKE
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 14 S3 E3

```
P0278          GYRO-TORQUING WAITLIST TASKS.

0279  REF   1                 13,2445  4 2661 0  STRTGYRO CS      GDESELCT        DE-SELECT LAST GYRO.
0280                          13,2446  0 0006 1           EXTEND
0281                          13,2447  03 014 1           WAND    14

0282  REF   4 LAST 145        13,2450  0 2674 0           TC      CAGETEST

0283  REF   5 LAST 149        13,2451  3 0356 1  STRTGYR2 CA      LGYRO           JUMP ON PHASE COUNTER IN BITS 13-14.
0284                          13,2452  0 0006 1           EXTEND
0285  REF  12 LAST 145        13,2453  7 7760 0           MP      BIT4
0286  REF  56 LAST 148        13,2454  50 000 1           INDEX   A
0287                          13,2455  1 2456 0           TCF     +1
0288  REF   1                 13,2456  0 2473 0           TC      GSELECT         =0. DO Y GYRO.
0289                          13,2457   00202 1           OCT     00202

0290  REF   2 LAST 150        13,2460  0 2473 0           TC      GSELECT         =1. DO Z GYRO.
0291                          13,2461   00302 0           OCT     00302

0292  REF   3 LAST 150        13,2462  0 2471 1           TC      GSELECT -2      =2. DO X GYRO.
0293                          13,2463   00100 0           OCT     00100

0294  REF  27 LAST 147        13,2464  3 7767 0           CAF     ZERO            =3. DONE
0295  REF   6 LAST 150        13,2465  54 356 0           TS      LGYRO
0296  REF   2 LAST 149        13,2466  3 2444 1           CAF     LGWAKE          WAKE A POSSIBLE SLEEPING JOB.
0297  REF   1                 13,2467  0 5551 0           TC      JOBWAKE

0308  REF   2 LAST 145        13,2470  1 2271 0  NORESET   TCF     IMUFINED        DO NOT RESET THE POWER SUPPLY
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 15 S3 E3

```
0309  REF   3 LAST 148   13,2471  4 7761 1  -2        CS    FOUR      SPECIAL ENTRY TO REGRESS LGYRO FOR X.
0310  REF   7 LAST 150   13,2472  26 356 0            ADS   LGYRO

0311  REF  31 LAST 146   13,2473  50 002 0  GSELECT   INDEX Q         SELECT GYRO.
0312                     13,2474  3 0000 1            CAF   0         PACKED WORD CONTAINS GYRO SELECT BITS
0313  REF   6 LAST  83   13,2475  54 064 1            TS    ITEMP4    AND INCREMENT TO LGYRO.
0314  REF   4 LAST 106   13,2476  7 7765 0            MASK  SEVEN
0315  REF   5 LAST 146   13,2477  6 7747 1            AD    BIT13
0316  REF   8 LAST 151   13,2500  26 356 0            ADS   LGYRO
0317  REF   8 LAST 148   13,2501  54 003 0            TS    EBANK
0318  REF   2 LAST 148   13,2502  7 4564 0            MASK  LOW8
0319  REF  21 LAST 148   13,2503  54 061 1            TS    ITEMP1

0320  REF   5 LAST 151   13,2504  4 7765 0            CS    SEVEN
0321  REF   7 LAST 151   13,2505  7 0064 1            MASK  ITEMP4
0322  REF   8 LAST 151   13,2506  54 064 1            TS    ITEMP4

0323                     13,2507  0 0006 1            EXTEND              MOVE DP COMMAND TO RUPTREGS FOR TESTING.
0324  REF  22 LAST 151   13,2510  5 0061 0            INDEX ITEMP1
0325                     13,2511  3 1401 0            DCA   1400
0326  REF  17 LAST 119   13,2512  52 071 0            DXCH  RUPTREG1

0327  REF  18 LAST 151   13,2513  10 070 1            CCS   RUPTREG1
0328  REF   1            13,2514  1 2527 1            TCF   MAJ+
0329                     13,2515  1 2517 1            TCF   +2
0330  REF   1            13,2516  1 2642 1            TCF   MAJ-

0331  REF   9 LAST 122   13,2517  10 071 0            CCS   RUPTREG2
0332  REF   1            13,2520  1 2524 1            TCF   MIN+
0333  REF   1            13,2521  1 2451 1            TCF   STRTGYR2
0334  REF   1            13,2522  1 2637 0            TCF   MIN-
0335  REF   2 LAST 151   13,2523  1 2451 1            TCF   STRTGYR2
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 16 S3 E3

```
0336  REF   1              13,2524  6 2560 0  MIN+     AD      -GYROMIN     SMALL POSITIVE COMMAND. SEE IF AT LEAST
0337                       13,2525  0 0006 1           EXTEND               1 GYRO PULSE.
0338  REF   3 LAST 151     13,2526  6 2451 0           BZMF    STRTGYR2

0339                       13,2527  0 0006 1  MAJ+     EXTEND               DEFINITE POSITIVE OUTPUT.
0340  REF   1              13,2530  3 2663 0           DCA     GYROERAC
0341  REF  19 LAST 151     13,2531  20 071 0           DAS     RUPTREG1

0342  REF   9 LAST 151     13,2532  3 0064 0           CA      ITEMP4       SELECT POSITIVE TORQUING FOR THIS GYRO.
0343                       13,2533  0 0006 1           EXTEND
0344                       13,2534  05 014 1           MOR     14

0345  REF   2 LAST  76     13,2535  3 5342 1           CAF     LOW7         LEAVE NUMBER OF POSSIBLE 8192 AJGMENTS
0346  REF  10 LAST 151     13,2536  7 0071 0           MASK    RUPTREG2     TO INITIAL COMMAND IN MAJOR PART OF LONG
0347  REF  11 LAST 152     13,2537  56 071 1           XCH     RUPTREG2     TERM STORAGE AND TRUNCATED FRACTION
0348                       13,2540  0 0006 1  GMERGE   EXTEND               IN MINOR PART. THE MAJOR PART WILL BE
0349  REF   5 LAST 115     13,2541  7 7754 1           MP      BIT8         COUNTED DOWN TO ZERO IN THE COURSE OF
0350  REF  11 LAST  83     13,2542  54 062 1           TS      ITEMP2       PUTTING OUT THE ENTIRE COMMAND.
0351  REF  20 LAST 152     13,2543  3 0070 0           CA      RUPTREG1
0352                       13,2544  0 0006 1           EXTEND
0353  REF   3 LAST 138     13,2545  7 7753 0           MP      BIT9
0354  REF  21 LAST 152     13,2546  54 070 1           TS      RUPTREG1
0355  REF  26 LAST 141     13,2547  3 0001 0           CA      L
0356                       13,2550  0 0006 1           EXTEND
0357  REF  11 LAST 136     13,2551  7 7746 1           MP      BIT14
0358  REF  12 LAST 152     13,2552  26 062 1           ADS     ITEMP2       INITIAL COMMAND.

0359                       13,2553  0 0006 1           EXTEND               SEE IF MORE THAN ONE PULSE TRAIN NEEDED
0360  REF  22 LAST 152     13,2554  3 0071 1           DCA     RUPTREG1     (MORE THAN 16383 PULSES).
0361  REF   1              13,2555  6 7771 1           AD      MINJS1
0362  REF  57 LAST 150     13,2556  10 000 0           CCS     A
0363  REF   1              13,2557  1 2603 1           TCF     LONGGYRO
0364                       13,2560   77600 1  -GYROMIN DCT     -177         MAY BE ADJUSTED TO SPECIFY MINIMUM CMD.

0365                       13,2561  1 2565 1           TCF     +4

0366  REF  12 LAST 152     13,2562  3 7746 0           CAF     BIT14
0367  REF  13 LAST 152     13,2563  26 062 1           ADS     ITEMP2
0368  REF  28 LAST 150     13,2564  3 7767 0           CAF     ZERO

0369  REF  23 LAST 151     13,2565  50 061 0  +4       INDEX   ITEMP1
0370                       13,2566  53,401 1           DXCH    1400
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 17 S3 E3

```
0371   REF  14 LAST 152   13,2567  3 0062 0            CA     ITEMP2      ENTIRE COMMAND.
0372   REF   2 LAST 125   13,2570  54 047 0  LASTSEG   TS     GYROCMD
0373                      13,2571  0 0006 1            EXTEND
0374   REF   9 LAST 147   13,2572  7 7752 1            MP     BIT10       WAITLIST DT
0375   REF   2 LAST  75   13,2573  6 6311 1            AD     THREE       TRUNCATION AND PHASE UNCERTAINTIES.
0376   REF  14 LAST 148   13,2574  0 5663 1            TC     WAITLIST
03765  REF  12 LAST 148                 E3            EBANK= COMMAND
0377                      13,2575    02445 0           2CADR  STRTGYRO
C0377  REF   2 LAST 148   13,2576    26063 0
0378   REF  10 LAST 153   13,2577  3 7752 0  GYROEXIT  CAF    BIT10       TURN ON GYRO ACTIVITY TO START TRAIN.
0379                      13,2600  0 0006 1            EXTEND
0380                      13,2601  05 014 1            NOR    14
0381   REF  10 LAST 145   13,2602  1 5727 1            TCF    TASKOVER

0382   REF  24 LAST 152   13,2603  50 061 0  LONGGYRO  INDEX  ITEMP1
0383                      13,2604  53,401 1            DXCH   1400        INITIAL COMMAND OUT PLUS N AUGMENTS OF
0384   REF  13 LAST 152   13,2605  3 7746 0            CAF    BIT14       8192. INITIAL COMMAND IS AT LEAST 8192.
0385   REF  15 LAST 153   13,2606  6 0062 0            AD     ITEMP2
0386   REF   3 LAST 153   13,2607  54 047 0            TS     GYROCMD

0387                      13,2610  0 0006 1  AUG3      EXTEND              GET WAITLIST DT TO TIME WHEN TRAIN IS
0388   REF  11 LAST 153   13,2611  7 7752 1            MP     BIT10       ALMOST OUT.
0389   REF   1            13,2612  6 5340 0            AD     NEG3
0390   REF  15 LAST 153   13,2613  0 5663 1            TC     WAITLIST
03905  REF  13 LAST 153                 E3            EBANK= COMMAND
0391                      13,2614    02617 0           2CADR  8192AUG
C0391  REF   1            13,2615    26063 0
0392   REF   1            13,2616  1 2577 1            TCF    GYROEXIT

0393   REF   5 LAST 150   13,2617  0 2674 0  8192AUG   TC     CAGETEST

0394   REF   9 LAST 151   13,2620  3 0356 1            CA     LGYRO       ADD 8192 PULSES TO GYROCMD
0395   REF   9 LAST 151   13,2621  54 003 0            TS     EBANK
0396   REF   3 LAST 151   13,2622  7 4564 0            MASK   LOWB
0397   REF  25 LAST 153   13,2623  54 061 1            TS     ITEMP1

0398   REF  26 LAST 153   13,2624  50 061 0            INDEX  ITEMP1      SEE IF THIS IS THE LAST AUG.
0399                      13,2625  11,400 0            CCS    1400
0400   REF   1            13,2626  1 2632 0            TCF    AUG2        MORE TO COME.

0401   REF  14 LAST 153   13,2627  3 7746 0            CAF    BIT14
0402   REF   4 LAST 153   13,2630  26 047 0            ADS    GYROCMD
0403   REF   1            13,2631  1 2571 1            TCF    LASTSEG +1

0404   REF  27 LAST 153   13,2632  50 061 0  AUG2      INDEX  ITEMP1
0405                      13,2633  55,400 0            TS     1400
0406   REF  15 LAST 153   13,2634  3 7746 0            CAF    BIT14
0407   REF   5 LAST 153   13,2635  26 047 0            ADS    GYROCMD
0408   REF   1            13,2636  1 2610 0            TCF    AUG3        COMPUTE DT.
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 18 S3 E3

```
0409  REF   2 LAST 152   13,2637  6 2560 0  MIN-    AD      -GYROMIN        POSSIBLE NEGATIVE OUTPUT.
0410                     13,2640  0 0006 1          EXTEND
0411  REF   4 LAST 152   13,2641  6 2451 0          BZMF    STRTGYR2

0412                     13,2642  0 0006 1  MAJ-    EXTEND                  DEFINITE NEGATIVE OUTPUT.
0413  REF   2 LAST 152   13,2643  4 2663 1          DCS     GYROFRAC
0414  REF  23 LAST 152   13,2644  20 071 0          DAS     RUPTREG1

0415  REF  10 LAST 152   13,2645  3 0064 0          CA      ITEMP4          SELECT NEGATIVE TORQUING FOR THIS GYRO.
0416  REF   4 LAST 152   13,2646  6 7753 1          AD      BIT9
0417                     13,2647  0 0006 1          EXTEND
0418                     13,2650  05 014 1          WOR     14

0419  REF  24 LAST 154   13,2651  4 0070 1          CS      RUPTREG1        SET UP RUPTREGS TO FALL INTO GMERGE.
0420  REF  25 LAST 154   13,2652  54 070 1          TS      RUPTREG1        ALL NUMBERS PUT INTO GYROCMD ARE
0421  REF  12 LAST 152   13,2653  4 0071 0          CS      RUPTREG2        POSITIVE - BIT9 OF CHAN 14 DETERMINES
0422  REF   3 LAST 152   13,2654  7 5342 0          MASK    LOW7            THE SIGN OF THE COMMAND.
0423                     13,2655  4 0000 0          COM
0424  REF  13 LAST 154   13,2656  56 071 1          XCH     RUPTREG2
0425                     13,2657  4 0000 0          COM
0426  REF   1            13,2660  1 2540 0          TCF     GMERGE

0427                     13,2661   01700 1  GDESELCT OCT     1700            TURN OFF SELECT AND ACTIVITY BITS.

0428                     13,2662   00000 1  GYROFRAC 2DEC    .215 B -21
C0428                    13,2663   00034 0
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 19 S3 E3

P0429 IMU MODE SWITCHING ROUTINES COME HERE WHEN ACTION COMPLETE.

```
0430                          13,2664  0 0006 1  ENDIMU    EXTEND                MODE IS BAD IF CAGE HAS OCCURED OR IF
0431                          13,2665  00 011 1             READ    11           ISS WARNING IS ON.
0432  REF    9 LAST 147       13,2666  7 7763 0             MASK    BIT1
0433  REF   58 LAST 152       13,2667  10 000 0             CCS     A
0434  REF    3 LAST 143       13,2670  1 2672 1             TCF     IMUBAD

0435  REF    1                13,2671  1 2720 1  IMUGOOD    TCF     GOODEND      WITH C(A) = 0.

0436  REF   29 LAST 152       13,2672  3 7767 0  IMUBAD     CAF     ZERO
0437  REF    1                13,2673  1 2715 1             TCF     BADEND

0438  REF   12 LAST 148       13,2674  3 7756 1  CAGETEST   CAF     BIT6         SUBROUTINE TO TERMINATE IMU MODE
0439  REF   50 LAST 147       13,2675  7 0365 0             MASK    IMODES30     SWITCH IF IMU HAS BEEN CAGED.
0440  REF   69 LAST 155       13,2676  10 000 0             CCS     A
0441  REF    4 LAST 155       13,2677  1 2672 1             TCF     IMUBAD       DIRECTLY.
0442  REF   32 LAST 151       13,2700  0 0002 0             TC      Q            WITH C(A) = +0.

0443  REF   51 LAST 155       13,2701  4 0365 0  CAGETSTQ   CS      IMODES30     SKIP IF IMU NOT BEING CAGED.
0444  REF   13 LAST 155       13,2702  7 7756 0             MASK    BIT6
0445  REF   70 LAST 155       13,2703  10 000 0             CCS     A
0446  REF   33 LAST 155       13,2704  24 002 0             INCR    Q
0447  REF   34 LAST 155       13,2705  0 0002 0             TC      Q

0448  REF   52 LAST 155       13,2706  4 0365 0  CAGETSTJ   CS      IMODES30     IF DURING MODE SWITCH INITIALIZATION
0449  REF   14 LAST 155       13,2707  7 7756 0             MASK    BIT6         IT IS FOUND THAT THE IMU IS BEING CAGED,
0450  REF   71 LAST 155       13,2710  10 000 0             CCS     A            SET IMUCADR TO -0 TO INDICATE OPERATION
0451  REF   35 LAST 155       13,2711  0 0002 0             TC      Q            COMPLETE BUT FAILED, RETURN IMMEDIATELY

0452  REF   30 LAST 155       13,2712  4 7767 1             CS      ZERO         TO SWRETURN.
0453  REF    2 LAST  98       13,2713  54 367 1             TS      IMUCADR
0454  REF    8 LAST 148       13,2714  1 2043 0             TCF     MODEFXIT
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 20 S3 E3

```
P0455          GENERALIZED MODE SWITCHING TERMINATION. ENTER AT GOODEND FOR SUCCESSFUL COMPLETION OF AN I/O OPERATION
R0457  OR AT BADEND FOR A N JNSUCCESSFUL ONE. C(A) OR ARRIVAL =0 FOR IMU, 1 FOR AOT, 2 FOR RADARS, & 3 FOR ATT MANU.

 0459  REF  14 LAST 154   13,2715  54 071 0  BADEND   TS     RUPTREG2    DEVICE INDEX.
 0460  REF  31 LAST 155   13,2716  4 7767 1           CS     ZERO        FOR FAILURE.
 0461  REF   2 LAST 155   13,2717  1 2722 0           TCF    GOODEND +2

 0462  REF  15 LAST 156   13,2720  54 071 0  GOODEND  TS     RUPTREG2
 0463  REF  17 LAST 149   13,2721  4 7763 0           CS     ONE         FOR SUCCESS.

 0464  REF   6 LAST  83   13,2722  54 072 0           TS     RUPTREG3
 0465  REF  16 LAST 156   13,2723  50 071 1           INDEX  RUPTREG2    SEE IF USING PROGRAM ASLEEP.
 0466  REF   5 LAST  23   13,2724  10 367 1           CCS    MODECADR
 0467                     13,2725  1 2727 0           TCF    +2          YES - WAKE IT UP.
 0468  REF   1            13,2726  1 2737 1           TCF    ENDMODE     IF 0, PROGRAM NOT IN YET.

 0469  REF  32 LAST 156   13,2727  3 7767 0           CAF    ZERO        WAKE SLEEPING PROGRAM.
 0470  REF  17 LAST 156   13,2730  50 071 1           INDEX  RUPTREG2
 0471  REF   6 LAST 156   13,2731  56 367 0           XCH    MODECADR
 0472  REF   2 LAST 150   13,2732  0 5551 0           TC     JOBWAKE

 0473  REF   7 LAST 156   13,2733  4 0072 0           CS     RUPTREG3    ADVANCE LOC IF SUCCESSFUL.
 0474  REF   1            13,2734  50 064 0           INDEX  LOCCTR
 0475  REF   1            13,2735  26 154 0           ADS    LOC

 0476  REF  11 LAST 153   13,2736  1 5727 1           TCF    TASKOVER

 0477  REF   8 LAST 156   13,2737  3 0072 1  ENDMODE  CA     RUPTREG3    =0 INDICATES OPERATION COMPLETE BUT
 0478  REF  18 LAST 156   13,2740  50 071 1           INDEX  RUPTREG2    UNSUCCESSFUL = -1 INDICATES COMPLETE AND
 0479  REF   7 LAST 156   13,2741  54 367 1           TS     MODECADR    SUCCESSFUL.
 0480  REF  12 LAST 156   13,2742  1 5727 1           TCF    TASKOVER
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 21 S3 E3

P0481 GENERAL STALLING ROUTINE. USING PROGRAMS COME HERE TO WAIT FOR I/O COMPLETION.

```
04823  REF   3 LAST 153     13,2743  3 6311 1  ATTSTALL  CAF     THREE      ATTITUDE MANEUVER STALL
04826  REF   1              13,2744  1 2752 1            TCF     STALL

0483   REF  10 LAST 148     13,2745  3 7762 0  RADSTALL  CAF     TWO        RR AND LR STALL.
0484   REF   2 LAST 157     13,2746  1 2752 1            TCF     STALL

0485   REF  18 LAST 156     13,2747  3 7763 1  AOTSTALL  CAF     ONE        AOT.
0486   REF   3 LAST 157     13,2750  0 2752 0            TC      STALL

0487   REF   1                       13,2747  OPTSTALL  EQUALS  AOTSTALL

0489   REF  33 LAST 156     13,2751  3 7767 0  IMUSTALL  CAF     ZERO       IMU.

0490                        13,2752  0 0004 0  STALL     INHINT
0491   REF  19 LAST 156     13,2753  54 071 0            TS      RUPTREG2   SAVE DEVICE INDEX.
0492   REF  72 LAST 155     13,2754  50 000 1            INDEX   A          SEE IF OPERATION COMPLETE.
0493   REF   8 LAST 156     13,2755  10 367 1            CCS     MODECADR
0494   REF   1              13,2756  1 2774 0            TCF     MODABORT   ALLOWABLE STATES ARE +0, -1, AND -0.
0495   REF   1              13,2757  1 2770 1            TCF     MODESLP    OPERATION INCOMPLETE.
0496   REF   1              13,2760  1 2764 1            TCF     MODEGOOD   COMPLETE AND GOOD IF = -1.

0497   REF  20 LAST 157     13,2761  50 071 1  MG2       INDEX   RUPTREG2   COMPLETE AND FAILED IF -0. RESET TO +0.
0498   REF   9 LAST 157     13,2762  54 367 1            TS      MODECADR   RETURN TO CALLER.
0499   REF   9 LAST 155     13,2763  1 2043 0            TCF     MODEEXIT

0500   REF  73 LAST 157     13,2764  10 000 0  MODEGOOD  CCS     A          MAKE SURE INITIAL STATE -1.
0501   REF   2 LAST 157     13,2765  1 2774 0            TCF     MODABORT

0502   REF   3 LAST 149     13,2766  24 123 1            INCR    BUF2       IF SO, INCREMENT RETURN ADDRESS AND
0503   REF   1              13,2767  1 2761 1            TCF     MG2        RETURN IMMEDIATELY, SETTING CADR = +0.

0504   REF   1              13,2770  0 5235 0  MODESLP   TC      MAKECADR   CALL FROM SWITCHABLE FIXED ONLY.
0505   REF  21 LAST 157     13,2771  50 071 1            INDEX   RUPTREG2
0506   REF  10 LAST 157     13,2772  54 367 1            TS      MODECADR
0507   REF   2 LAST 149     13,2773  1 5545 1            TCF     JOBSLEEP

0508   REF   1              13,2774  0 6000 1  MODABORT  TC      ABORT      TWO PROGRAMS USING SAME DEVICE.
0509                        13,2775   01210 0            OCT     1210
```

L IMU MODE SWITCHING ROUTINES USER'S OWN PAGE NO. 22 S3 E3

P0510 CONSTANTS FOR MODE SWITCHING ROUTINES

```
0511                    13,2776   00014 1  BITS3&4   OCT     14
0512                    13,2777   00050 1  BITS4&6   OCT     00050
0513                    13,3000   00070 0  BITS4-6   OCT     00070
0514  REF   6 LAST 152                7754  IMUSEFLG  EQUALS  BIT8          INTERPRETER SWITCH 7.
0515                    13,3001   70000 0  13,14,15  OCT     70000

0516                    13,3002   77500 1  -COMMAX   DEC     -191
0517                    13,3003   77477 0  -COMMAX-  DEC     -192
0518                    13,3004   00074 1  60DMS     DEC     60
0519  REF   1                        4322  3SECSM    EQUALS  3SECS
```

L AOTMARK USER'S OWN PAGE NO. 1 S3

```
0001                                    13,3005             BANK    13
0002  REF   2 LAST  61                                E3    EBANK=  AOTAZ
0003                          13,3005   0 0004 0    AOTMARK INHINT
0004  REF  22 LAST 157       13,3006   54 071 0            TS      RUPTREG2        BIT14=INFLIGHT  0=NONFLIGHT
0005  REF   2 LAST  98       13,3007   10 373 1            CCS     MARKSTAT        ARE MARKS BUTTONS IN USE
0006                          13,3010   0 3012 1            TC      +2              MARKS BUTTONS NOT AVAILABLE
0007  REF   1                 13,3011   0 3015 0            TC      MKVAC           FIND A VAC AREA
0008  REF  16 LAST 147        13,3012   0 4755 1            TC      ALARM
0009                          13,3013    00105 0            OCT     00105
0010  REF   4 LAST 102        13,3014   0 5567 0            TC      ENDOFJOB

0011  REF   3 LAST  99       13,3015   10 430 1    MKVAC   CCS     VAC1USE
0012  REF   1                 13,3016   0 3031 0            TC      MKVACFND
0013  REF   2 LAST  97       13,3017   10 504 1            CCS     VAC2USE
0014  REF   2 LAST 159       13,3020   0 3031 0            TC      MKVACFND
0015  REF   2 LAST  97       13,3021   10 560 0            CCS     VAC3USE
0016  REF   3 LAST 159       13,3022   0 3031 0            TC      MKVACFND
0017  REF   2 LAST  97       13,3023   10 634 1            CCS     VAC4USE
0018  REF   4 LAST 159       13,3024   0 3031 0            TC      MKVACFND
0019  REF   2 LAST  97       13,3025   10 710 0            CCS     VAC5USE
0020  REF   5 LAST 159       13,3026   0 3031 0            TC      MKVACFND
0021  REF   2 LAST 157       13,3027   0 6000 1            TC      ABORT           VAC AREAS OCCUPIED
0022                          13,3030    01207 0            OCT     01207

0023  REF  11 LAST 157       13,3031   6 7762 0    MKVACFND AD     TWO
0024  REF   3 LAST 159       13,3032   54 373 1            TS      MARKSTAT
0025  REF  34 LAST 157       13,3033   3 7767 0            CAF     ZERO
0026  REF   1                 13,3034   54 374 0            TS      XYMARK          INITIALIZE MARK ID REGISTER
0027  REF   4 LAST 159       13,3035   50 373 0            INDEX   MARKSTAT
0028                          13,3036   53777 0             TS      0 -1            SHOW VAC OCCUPIED

0029  REF  23 LAST 159       13,3037   3 0071 1            CA      RUPTREG2
0030  REF   5 LAST 159       13,3040   26 373 1            ADS     MARKSTAT

0031  REF   1                 13,3041   3 5653 1            CAF     PRIO32
0032  REF   3 LAST  93       13,3042   0 5505 1            TC      NOVAC
00325 REF   3 LAST 159                                E3    EBANK=  AOTAZ
0033                          13,3043    03054 0            2CADR   GETMKS
C0033 REF   1                 13,3044    26063 0
0034  REF  10 LAST 157        13,3045   0 2043 1            TC      MODEEXIT

0035  REF  35 LAST 159        13,3046   3 7767 0    MKRELEAS CAF    ZERO
0036  REF   6 LAST 159        13,3047   56 373 0            XCH     MARKSTAT        SET MARKSTAT  ZERO
0037  REF  74 LAST 157        13,3050   10 000 0            CCS     A
0038  REF  75 LAST 159        13,3051   50 000 1            INDEX   A
0039                          13,3052   54 000 0            TS      0               SHOW VAC AREA AVAILABLE
0040  REF   4 LAST 147        13,3053   0 5221 0            TC      SWRETURN
```

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0041  REF  36 LAST 159   13,3054  3 7767 0  GETMKS   CAF   ZERO
0042  REF   2 LAST 159   13,3055  54 374 0           TS    XYMARK
0043  REF  16 LAST 153   13,3056  3 7746 0           CAF   BIT14      FIND IF IN-FLIGHT OR NON-FLIGHT
0044  REF   7 LAST 159   13,3057  7 0373 1           MASK  MARKSTAT
0045  REF  76 LAST 159   13,3060  10 000 0           CCS   A
0046  REF   1            13,3061  0 3070 0           TC    MKV353     IN-FLIGHT
0047  REF   3 LAST 134   13,3062  4 7751 1           CS    BIT11      NON-FLIGHT, SET Y MARK =1
0048  REF   8 LAST 160   13,3063  7 0373 1           MASK  MARKSTAT
0049  REF   4 LAST 160   13,3064  6 7751 0           AD    BIT11
0050  REF   9 LAST 160   13,3065  54 373 1           TS    MARKSTAT
0051  REF   1            13,3066  3 3415 1           CAF   VB51       REQUEST X MARK
0052                     13,3067  0 3071 1           TC    +2
0053  REF   1            13,3070  3 3471 0  MKVB53   CAF   VB53       REQUEST X AND Y MARKS
0054  REF   1            13,3071  0 4657 1           TC    NVSBWAIT
0055  REF   1            13,3072  0 4622 0           TC    FLASHON
0056  REF   1            13,3073  0 4475 0           TC    ENDIDLE
0057  REF   2 LAST 159   13,3074  0 3055 1           TC    GETMKS +1
0058  REF   3 LAST 160   13,3075  0 3055 1           TC    GETMKS +1

0059  REF  12 LAST 153   13,3076  3 7752 0  MKCHEK   CAF   BIT10      WAS X MARK MADE
0060  REF  10 LAST 160   13,3077  7 0373 1           MASK  MARKSTAT
0061  REF  77 LAST 160   13,3100  10 000 0           CCS   A
0062                     13,3101  0 3103 0           TC    +2         X MARK MADE-LOOK AT Y MARK
0063  REF   1            13,3102  0 3107 1           TC    MKALARM
0064  REF   5 LAST 160   13,3103  3 7751 0           CAF   BIT11
0065  REF  11 LAST 160   13,3104  7 0373 1           MASK  MARKSTAT
0066  REF  78 LAST 160   13,3105  10 000 0           CCS   A
0067  REF   1            13,3106  0 3115 1           TC    GETDET     BOTH MARKS MADE-SHOW ACCEPT-GET DETENT

0068  REF  17 LAST 159   13,3107  0 4755 1  MKALARM  TC    ALARM      IF EITHER MARK IS MISSING AFTER ENTER
0069                     13,3110  00111 0            OCT   111
0070  REF   1            13,3111  4 5643 1           CS    PRIO17     SET BITS 10,11,12,13 TO ZERO IN MARKSTAT
0071  REF  12 LAST 160   13,3112  7 0373 1           MASK  MARKSTAT
0072  REF  13 LAST 160   13,3113  54 373 1           TS    MARKSTAT
0073  REF   4 LAST 160   13,3114  0 3054 0           TC    GETMKS     GETMKS AGAIN

0074  REF   7 LAST  97   13,3115  4 7750 0  GETDET   CS    BIT12
0075  REF  14 LAST 160   13,3116  7 0373 1           MASK  MARKSTAT
0076  REF   8 LAST 160   13,3117  6 7750 1           AD    BIT12      SET BIT12=1 TO SHOW MARKS ACCEPTED
0077  REF  15 LAST 160   13,3120  54 373 1           TS    MARKSTAT
0078  REF   1            13,3121  3 3467 1  DETVB21  CAF   V21N43E
0079  REF   2 LAST 160   13,3122  0 4657 1           TC    NVSBWAIT
0080  REF   2 LAST 160   13,3123  0 4475 0           TC    ENDIDLE
0081  REF   1            13,3124  0 3121 0           TC    DETVB21
0082  REF   2 LAST 160   13,3125  0 3121 0           TC    DETVB21

0083  REF   1            13,3126  4 6311 0           CS    OCT3
0084  REF   1            13,3127  7 0374 0           MASK  DETCODE
0085  REF  79 LAST 160   13,3130  10 000 0           CCS   A
0086  REF   3 LAST 160   13,3131  0 3121 0           TC    DETVB21    BAD CODE, REQUEST AGAIN
```

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0087                          13,3132  0 3135 0          TC      +3              LOOKS GOOD BUT COULD BE ZERO
0088                          13,3133  0 3134 1          TC      +1
0089  REF   4 LAST 160       13,3134  0 3121 0          TC      DETVB21
0090  REF   2 LAST 160       13,3135  3 6311 1          CAF     OCT3
0091  REF   2 LAST 160       13,3136  7 0374 0          MASK    DETCODE         SEE IF ZERO
0092  REF  80 LAST 160       13,3137  10 000 0          CCS     A
0093                          13,3140  0 3142 0          TC      +2              GOOD CODE-STORE ANGLES
0094  REF   5 LAST 161       13,3141  0 3121 0          TC      DETVB21         ZERO-BAD CODE-REQUEST AGAIN

0095  REF   1                 13,3142  3 5341 1          CAF     LOW9
0096  REF  16 LAST 160        13,3143  7 0373 1          MASK    MARKSTAT
0097  REF   1                 13,3144  54 002 1          TS      BASVAC          STORE VAC AREA ADDRESS
0098  REF   3 LAST 161        13,3145  50 374 1          INDEX   DETCODE
0099  REF   1                 13,3146  3 1471 1          CA      AOTEL -1
0100  REF   2 LAST 161        13,3147  50 002 0          INDEX   BASVAC
0101                          13,3150  54 011 0          TS      9D              STORE ELV ANGLE IN VAC +9
0102  REF   4 LAST 161        13,3151  50 374 1          INDEX   DETCODE
0103  REF   4 LAST 159        13,3152  3 1466 1          CA      AOTAZ -1
0104  REF   3 LAST 161        13,3153  50 002 0          INDEX   BASVAC
0105                          13,3154  54 010 1          TS      8D              STORE AZIMUTH IN VAC +8

01051 REF   5 LAST 161        13,3155  3 1470 0          CA      AOTAZ +1        COMPENSATION FOR THE APPARENT TILT OF
01052                         13,3156  0 0006 1          EXTEND                  AOT FIELD OF VIEW IN THE LEFT AND RIGHT
01053 REF   5 LAST 161        13,3157  5 0374 1          INDEX   DETCODE         DETENTS IS STORED IN LOC 10D OF VAC
01054 REF   6 LAST 161        13,3160  21'466 0          MSU     AOTAZ -1        IN ONES COMPLEMENT
01055 REF   4 LAST 161        13,3161  50 002 0          INDEX   BASVAC
01056                         13,3162  54 012 0          TS      10D             SINGLE PREC. TILT COMPENSATION  ANGLE

0106  REF  17 LAST 160        13,3163  3 7746 0          CAF     BIT14           IN-FLIGHT OR NON-FLIGHT
0107  REF  17 LAST 161        13,3164  7 0373 1          MASK    MARKSTAT
0108  REF  81 LAST 161        13,3165  10 000 0          CCS     A
0109  REF   1                 13,3166  0 3206 0          TC      MKOJT           IN-FLIGHT, NO MORE DATA NEEDED
0110  REF   1                 13,3167  0 3170 1          TC      ROTVB24         NON-FLIGHT, GET ROTATION ANGLES

0111  REF   1                 13,3170  3 3470 1 ROTVB24  CAF     V24N42E         REQUEST RETICLE ROTATION ANGLES
0112  REF   3 LAST 160        13,3171  0 4657 1          TC      NVSBWAIT
0113  REF   3 LAST 160        13,3172  0 4475 0          TC      ENDIDLE
0114  REF   2 LAST 161        13,3173  0 3170 1          TC      ROTVB24
0115  REF   3 LAST 161        13,3174  0 3170 1          TC      ROTVB24

0116  REF   2 LAST 161        13,3175  3 5341 1          CAF     LOW9
0117  REF  18 LAST 161        13,3176  7 0373 1          MASK    MARKSTAT
0118  REF   5 LAST 161        13,3177  54 002 1          TS      BASVAC
0119  REF   1                 13,3200  3 0342 1          CA      DSPTEM2         YROT
0120  REF   6 LAST 161        13,3201  50 002 0          INDEX   BASVAC
0121                          13,3202  54 003 0          TS      3               STORE Y RETICLE ROT ANGLE IN VAC +3
0122  REF   2 LAST 161        13,3203  3 0343 0          CA      DSPTEM2 +1      SROT
0123  REF   7 LAST 161        13,3204  50 002 0          INDEX   BASVAC
0124                          13,3205  54 005 0          TS      5               STORE SPIRAL ROT ANGLE VAC +5
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0125   REF   3 LAST 161    13,3206  3 5341 1  MKOUT    CAF     LOW9
0126   REF  19 LAST 161    13,3207  7 0373 1           MASK    MARKSTAT
0127   REF  20 LAST 162    13,3210  54 373 1           TS      MARKSTAT       SET HIS ZERO

0128                        13,3211  0 0004 0           INHINT
0129   REF  19 LAST 157     13,3212  3 7763 1           CAF     ONE
0130   REF  16 LAST 153     13,3213  0 5663 1           TC      WAITLIST
01305  REF   7 LAST 161                    E3           EBANK=  AOTAZ
0131                        13,3214   03217 0           2CADR   ENDMARKS
C0131  REF   1              13,3215   26063 0
0132   REF   5 LAST 159     13,3216  0 5567 0           TC      ENDOFJOB

0133   REF  20 LAST 162     13,3217  3 7763 1  ENDMARKS CAF     ONE
0134   REF   3 LAST 156     13,3220  1 2720 1           TCF     GOODEND
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0135  REF   2 LAST 104    13,3221  54 016 1  MARKRUPT TS     BANKRUPT
0136  REF   2 LAST 137    13,3222  3 0033 1            CA     CDUY        STORE CDU DATA AND TIME IN TEMP
0137  REF   7 LAST  83    13,3223  54 063 0            TS     ITEMP3
0138  REF   5 LAST 137    13,3224  3 0034 0            CA     CDUZ
0139  REF  11 LAST 154    13,3225  54 064 1            TS     ITEMP4
0140  REF   6 LAST 143    13,3226  3 0032 0            CA     CDUX
0141  REF   6 LAST  83    13,3227  54 065 0            TS     ITEMP5
0142                       13,3230  0 0006 1            EXTEND
0143  REF   3 LAST  84    13,3231  3 0025 0            DCA    TIME2
0144  REF  28 LAST 153    13,3232  52 062 1            DXCH   ITEMP1
0145  REF  36 LAST 155    13,3233  56 002 0            XCH    Q
0146  REF   2 LAST 106    13,3234  54 012 0            TS     QRUPT

0147  REF   1             13,3235  3 3465 0            CAF    DOT34       SEE IF X OR Y MARK OR MKREJECT
0148                       13,3236  0 0006 1            EXTEND
0149  REF   1             13,3237  02 016 1            RAND   NAVKEYIN
0150  REF  82 LAST 161    13,3240  10 000 0            CCS    A
0151                       13,3241  0 3243 1            TC     +2          ITS A LIVE ONE-CHECK FOR ACCEPT
0152  REF   1             13,3242  0 3273 1            TC     SOMEKEY     SOME OTHER KEY

0153  REF   9 LAST 160    13,3243  3 7750 1            CAF    BIT12       HAVE MARKS BEEN ACCEPTED
0154  REF  21 LAST 162    13,3244  7 0373 1            MASK   MARKSTAT
0155  REF  83 LAST 163    13,3245  10 000 0            CCS    A
0156  REF   6 LAST 136    13,3246  0 5733 0            TC     RESUME      MARKS MADE AND ACCEPTED - DO NOTHING

0157  REF  22 LAST 163    13,3247  10 373 1            CCS    MARKSTAT    ARE MARKS BEING ACCEPTED
0158  REF   1             13,3250  0 3254 1            TC     FINDKEY
0159  REF  18 LAST 160    13,3251  0 4755 1            TC     ALARM       MARKS NOT BEING ACCEPTED
0160                       13,3252  00112 0             DOT    112
0161  REF   7 LAST 163    13,3253  0 5733 0            TC     RESUME

0162  REF   6 LAST 146    13,3254  3 7757 0  FINDKEY   CAF    BIT5
0163                       13,3255  0 0006 1            EXTEND
0164  REF   2 LAST 163    13,3256  02 016 1            RAND   NAVKEYIN    CHANNEL 16
0165  REF  84 LAST 163    13,3257  10 000 0            CCS    A
0166  REF   1             13,3260  0 3421 0            TC     MKREJ       ITS A MARK REJECT
0167  REF  13 LAST 150    13,3261  3 7760 1            CAF    BIT4
0168                       13,3262  0 0006 1            EXTEND
0169  REF   3 LAST 163    13,3263  02 016 1            RAND   NAVKEYIN
0170  REF  85 LAST 163    13,3264  10 000 0            CCS    A
0171  REF   1             13,3265  0 3311 1            TC     YMKRUPT     ITS A Y MARK
0172  REF   1             13,3266  3 7761 0            CAF    BIT3
0173                       13,3267  0 0006 1            EXTEND
0174  REF   4 LAST 163    13,3270  02 016 1            RAND   NAVKEYIN
0175  REF  86 LAST 163    13,3271  10 000 0            CCS    A
0176  REF   1             13,3272  0 3305 1            TC     XMKRUPT     ITS AN X MARK
0177  REF   1             13,3273  3 3466 0  SOMEKEY   CAF    DOT140      NOT MARK OR MARK REJECT
0178                       13,3274  0 0006 1            EXTEND
0179  REF   5 LAST 163    13,3275  02 016 1            RAND   NAVKEYIN
0180                       13,3276  0 0006 1            EXTEND
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0181                        13,3277  1 3302 1            BZF     +3          IF NO INBITS.

0182  REF   6 LAST 116      13,3300  0 5225 1            TC      POSTJUMP    IF DESCENT BITS.
0183  REF   1               13,3301    22707 1           CADR    DESCBITS

0184  REF  19 LAST 163      13,3302  0 4755 1  +3        TC      ALARM
0185                        13,3303    00113 1           OCT     113
0186  REF   8 LAST 163      13,3304  0 5733 0            TC      RESJME

0187  REF  37 LAST 160      13,3305  3 7767 0  XMKRUPT    CAF     ZERO
0188  REF  26 LAST 154      13,3306  54 070 1            TS      RUPTREG1    SET X MARK STORE INDEX TO ZERO
0189  REF  13 LAST 160      13,3307  3 7752 0            CAF     BIT10
0190                        13,3310  0 3314 1            TC      +4
0191  REF  21 LAST 162      13,3311  3 7763 1  YMKRUPT    CAF     ONE
0192  REF  27 LAST 164      13,3312  54 070 1            TS      RUPTREG1    SET Y MARK STORE INDEX TO ONE
0193  REF   6 LAST 160      13,3313  3 7751 0            CAF     BIT11
0194  REF   3 LAST 160      13,3314  54 374 0            TS      XYMARK      SET MARK ID

0195  REF  23 LAST 163      13,3315  7 0373 1            MASK    MARKSTAT
0196  REF  37 LAST 163      13,3316  10 000 0            CCS     A
0197                        13,3317  0 3321 1            TC      +2          MARK MADE BUT NOT DESIRED
0198  REF   1               13,3320  0 3324 1            TC      VACSTOR     MARK DESIRED AND MADE-STORE CDUS
0199  REF  20 LAST 164      13,3321  0 4755 1            TC      ALARM
0200                        13,3322    00114 0           OCT     114
0201  REF   1               13,3323  0 3355 1            TC      REMARK      RENEW REQUEST

0202  REF   4 LAST 162      13,3324  3 5341 1  VACSTOR    CAF     LOW9        STORE TIME AND CDUS IN VAC AREA
0203  REF  24 LAST 164      13,3325  7 0373 1            MASK    MARKSTAT
0204  REF  24 LAST 159      13,3326  54 071 0            TS      RUPTREG2    PICK UP VAC ADR
0205                        13,3327  0 0006 1            EXTEND
0206  REF  29 LAST 163      13,3330  3 0062 0            DCA     ITEMP1
0207  REF  25 LAST 164      13,3331  50 071 1            INDEX   RUPTREG2
0208                        13,3332  52 001 1            DXCH    0           STORE TIME1 AND TIME2 IN VAC
0209  REF  26 LAST 164      13,3333  3 0071 1            CA      RUPTREG2
0210  REF  28 LAST 164      13,3334  26 070 1            ADS     RUPTREG1    INCREMENT CDU STORE ADR BY MARK INDEX
0211  REF   8 LAST 163      13,3335  3 0063 1            CA      ITEMP3      PICK UP CDUY
0212  REF  29 LAST 164      13,3336  50 070 0            INDEX   RUPTREG1
0213                        13,3337  54 002 1            TS      2
0214  REF  12 LAST 163      13,3340  3 0064 0            CA      ITEMP4      PICK UP CDUZ
0215  REF  30 LAST 164      13,3341  50 070 0            INDEX   RUPTREG1
0216                        13,3342  54 004 1            TS      4
0217  REF   7 LAST 163      13,3343  3 0065 1            CA      ITEMP5      PICK UP CDUX
0218  REF  31 LAST 164      13,3344  50 070 0            INDEX   RUPTREG1
0219                        13,3345  54 006 0            TS      6

0220  REF   6 LAST 151      13,3346  3 7747 1            CAF     BIT13
0221  REF   4 LAST 164      13,3347  6 0374 1            AD      XYMARK
0222                        13,3350  4 0000 0            COM
0223  REF  25 LAST 164      13,3351  7 0373 1            MASK    MARKSTAT
0224  REF   5 LAST 164      13,3352  6 0374 1            AD      XYMARK      SET MARK MADE BIT IN MARKSTAT=1
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0225  REF  26 LAST 164    13,3353  54 373 1        TS    MARKSTAT      AND SET BIT13 ZERO TO SHOW MARK
0226  REF   2 LAST 164    13,3354  0 3355 1        TC    REMARK        MADE BEFORE A REJECT - GO REMARK
```

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0227   REF  38 LAST 164   13,3355  3 7767 0  REMARK   CAF    ZERO
0228   REF   1           13,3356  54 073 1           TS     MKDEX          MKDEX=0
0229   REF   7 LAST 164  13,3357  3 7751 0           CAF    BIT11          LOOK A Y MARK
0230   REF  27 LAST 165  13,3360  7 0373 1           MASK   MARKSTAT
0231   REF  38 LAST 164  13,3361  10 000 0           CCS    A
0232                     13,3362  0 3365 1           TC     +3             Y MARK MADE
0233   REF   7 LAST 158  13,3363  3 7754 0           CAF    BIT8           Y MARK REQUIRED
0234   REF   2 LAST 166  13,3364  54 073 1           TS     MKDEX

0235   REF  14 LAST 164  13,3365  3 7752 0           CAF    BIT10          LOOK AT X MARK
0236   REF  28 LAST 166  13,3366  7 0373 1           MASK   MARKSTAT
0237   REF  39 LAST 166  13,3367  10 000 0           CCS    A
0238   REF   1           13,3370  0 3373 0           TC     MKJOB
0239   REF   9 LAST 133  13,3371  3 7755 1           CAF    BIT7           X MARK REQUIRED
0240   REF   3 LAST 166  13,3372  26 073 1           ADS    MKDEX

0241   REF   2 LAST 159  13,3373  3 5653 1  MKJOB    CAF    PRIO32
0242   REF   4 LAST 159  13,3374  0 5505 1           TC     NOVAC          ENTER JOB TO PASTE VERB
02425  REF   8 LAST 162                E3            EBANK= ADTAZ
0243                     13,3375   03403 0           2CADR  CHANGVB
C0243  REF   1           13,3376   26063 0
0244   REF   6 LAST  83  13,3377  3 0073 0           CA     RUPTREG4
0245   REF   2 LAST 156  13,3400  50 064 0           INDEX  LOCCTR
0246   REF  51 LAST 149  13,3401  54 144 1           TS     MPAC
0247   REF   9 LAST 164  13,3402  0 5733 0           TC     RESJME

0248   REF  52 LAST 166  13,3403  10 144 1  CHANGVB  CCS    MPAC
0249   REF   1           13,3404  0 3407 1           TC     SHOWVB
0250   REF   1           13,3405  3 3472 0           CAF    VB21N30E
0251   REF   2 LAST 166  13,3406  0 3411 0           TC     SHOWVB +2
0252   REF   1           13,3407  3 3473 1  SHOWVB   CAF    VB50
0253   REF  53 LAST 166  13,3410  6 0144 0           AD     MPAC
0254   REF   1           13,3411  54 113 0           TS     NVTEMP
0255   REF   2 LAST  98  13,3412  3 0327 1           CA     CADRSTOR       NVSUB CLOBBERS THIS-USE LOC AS TEMP
0256   REF   2 LAST 156  13,3413  54 154 0           TS     LOC
0257   REF   1           13,3414  0 4447 1           TC     NVSUB +3
0258                     13,3415   05100 0  V351     OCT    5100
0259   REF   3 LAST 166  13,3416  3 0154 1           CA     LOC            RESTORE CADRSTOR
0260   REF   3 LAST 166  13,3417  54 327 0           TS     CADRSTOR
0261   REF   6 LAST 162  13,3420  0 5567 0           TC     ENDOFJOB

0262   REF  18 LAST 161  13,3421  3 7746 0  MKREJ    CAF    BIT14          IN-FLIGHT OR NON-FLIGHT
0263   REF  29 LAST 166  13,3422  7 0373 1           MASK   MARKSTAT
0264   REF  90 LAST 166  13,3423  10 000 0           CCS    A
0265   REF   1           13,3424  0 3432 1           TC     REJIN          IN-FLIGHT
0266   REF  15 LAST 166  13,3425  3 7752 0           CAF    BIT10          NON-FLIGHT, SEE IF X MARK MADE
0267   REF  30 LAST 166  13,3426  7 0373 1           MASK   MARKSTAT
0268   REF  91 LAST 166  13,3427  10 000 0           CCS    A
0269   REF   1           13,3430  0 3454 1           TC     REJECT2        XMARK MADE-REJECT IT
0270   REF   1           13,3431  0 3436 0           TC     REJALARM       X MARK NOT MADE-ALARM-NO MARKS TO REJ
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0271  REF   1                13,3432  3 5632 0  REJIN     CAF     PRIO3      WERE IN-FLIGHT MARKS MADE
0272  REF  31 LAST 166       13,3433  7 0373 1             MASK    MARKSTAT
0273  REF  32 LAST 166       13,3434  10 000 0             CCS     A
0274  REF   1                13,3435  0 3441 0             TC      REJECT     MARKS MADE-REJECT ONE
0275  REF  21 LAST 164       13,3436  0 4755 1  REJALARM  TC      ALARM      NO MARKS MADE TO REJECT-GET MARKS
0276                         13,3437   00115 1             OCT     115
0277  REF   2 LAST 166       13,3440  0 3454 1             TC      REJECT2
0278  REF   7 LAST 164       13,3441  4 7747 0  REJECT    CS      BIT13      SHOW MKREJECT AND SEE MARK MADE
0279  REF  32 LAST 167       13,3442  7 0373 1             MASK    MARKSTAT   SINCE LAST REJECT
0280  REF   8 LAST 167       13,3443  6 7747 1             AD      BIT13
0281  REF  33 LAST 167       13,3444  56 373 0             XCH     MARKSTAT
0282  REF   9 LAST 167       13,3445  7 7747 0             MASK    BIT13
0283  REF  33 LAST 167       13,3446  10 000 0             CCS     A
0284  REF   3 LAST 167       13,3447  0 3454 1             TC      REJECT2    ANOTHER REJECT
0285  REF   6 LAST 164       13,3450  4 0374 0             CS      XYMARK     MARK MADE SINCE LAST REJECT-REJECT IT
0286  REF  34 LAST 167       13,3451  7 0373 1             MASK    MARKSTAT
0287  REF  35 LAST 167       13,3452  54 373 1             TS      MARKSTAT
0288  REF   3 LAST 165       13,3453  0 3355 1             TC      REMARK     GO REQUEST MARKS

0289  REF   2 LAST 167       13,3454  4 5632 1  REJECT2   CS      PRIO3      NO MARKS SINCE LAST REJECT SO SET
0290  REF  36 LAST 167       13,3455  7 0373 1             MASK    MARKSTAT   MARKSTAT TO WANT X AND Y MARKS
0291  REF  37 LAST 167       13,3456  56 373 0             XCH     MARKSTAT
0292  REF  19 LAST 166       13,3457  7 7746 1             MASK    BIT14      IN-FLIGHT OR NON-FLIGHT
0293  REF  34 LAST 167       13,3460  10 000 0             CCS     A
0294  REF   4 LAST 167       13,3461  0 3355 1             TC      REMARK     IN-FLIGHT, GO GET MARKS
0295  REF   8 LAST 166       13,3462  3 7751 0             CAF     BIT11      NON-FLIGHT, STILL REQUEST X MARK ONLY
0296  REF  38 LAST 167       13,3463  26 373 1             ADS     MARKSTAT
0297  REF   5 LAST 167       13,3464  0 3355 1             TC      REMARK     GO GET X MARK

0298  REF   4 LAST 157                  6311   OCT3      EQUALS  THREE
0299                         13,3465  00034 0  OCT34     OCT     00034
0300                         13,3466  00140 1  OCT140    OCT     00140
0301                         13,3467  02143 0  V21N43E   OCT     2143
0302                         13,3470  02442 1  V24N42E   OCT     2442
0303                         13,3471  05300 1  V53       OCT     5300
0304  REF   7 LAST 166            0073  MKDEX     EQUALS  RUPTREG4
0305  REF   7 LAST 167            0374  DETCODE   EQUALS  XYMARK
0306  REF  37 LAST 163            0002  BASVAC    EQUALS  Q
0307                         13,3472  02130 1  V21N30E   OCT     2130
0308                         13,3473  05000 1  V50       OCT     5000
```

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```
0001                                    4323        BLOCK  02
0002  REF   1                           E3          EBANK= RRRET

R0003         THE FOLLOWING SUBROUTINE RETURNS TO CALLER + 2 IF THE ABSOLUTE VALUE OF C(A) IS GREATER THAN THE
R0005  NEGATIVE OF THE NUMBER AT CALLER +1. OTHERWISE IT RETURNS TO CALLER +3. MAY BE CALLED IN RUPT OR UNDER EXEC.

0007                                4323  0 0006 1  MAGSUB  EXTEND
0008                                4324  6 4326 1          BZMF   +2
0009                                4325  1 4327 1          TCF    +2
0010                                4326  4 0000 0          COM

0011  REF  38 LAST 167              4327  50 002 0          INDEX  Q
0012                                4330  6 0000 1          AD     0
0013                                4331  0 0006 1          EXTEND
0014  REF   3 LAST  77              4332  6 7017 0          BZMF   Q+2     ABS(A) LEQ CONSTANT
0015  REF   2 LAST  77              4333  1 7015 0          TCF    Q+1     ABS(A) G CONSTANT
```

L0001 RADAR LEAD-IN ROUTINES USER'S OWN PAGE NO. 2 S3 E3

P0019 THE FOLLOWING SUBROUTINE CHECKS RR GIMBAL ANGLES TO SEE IF THEY ARE IN THE LIMITS OF THE CURRENT MODE.
R0021 CALLING SEQUENCE IS AS FOLLOWS:

```
A0022                                          TC      RRLIMCHK        (WITH INTERRUPT INHIBITED).
A0023                                          ADRES   T,S             (IN UNSWITCHED E OR CURRENT EBANK).

R0024          RETURN IS TO CALLER +2 IF NOT IN LIMITS AND TO CALLER +3 IF SO.

 0025  REF  39 LAST 168    4334  50 002 0  RRLIMCHK INDEX   Q           READ GIMBAL ANGLES INTO ITEMP STORAGE.
 0026                      4335  3 0000 1           CAF     0
 0027  REF  40 LAST 169    4336  24 002 0           INCR    Q
 0028                      4337  0 0006 1           EXTEND
 0029  REF  35 LAST 167    4340  5 0000 1           INDEX   A
 0030                      4341  3 0001 0           DCA     0
 0031  REF  30 LAST 164    4342  52 062 1           DXCH    ITEMP1
 0032  REF  41 LAST 169    4343  22 002 0           LXCH    Q           L(CALLER +2) TO L.

 0033  REF  10 LAST 163    4344  3 7750 1           CAF     BIT12       SEE WHICH MODE RR IS IN.
 0034  REF  14 LAST 134    4345  7 0412 1           MASK    RADMODES
 0035  REF  36 LAST 169    4346  10 000 0           CCS     A
 0036  REF   1             4347  1 4362 0           TCF     MODE2CHK

 0037  REF  31 LAST 169    4350  3 0061 0           CA      ITEMP1      MODE 1 IS DEFINED AS
 0038  REF   1             4351  0 4323 1           TC      MAGSUB          1. ABS(T) L 55 DEGS.
 0039                      4352   66161 1           DEC     -.30555         2. ABS(S + 5.5 DEGS) L 64.5 DEGS
 0040  REF  27 LAST 152    4353  0 0001 0           TC      L                   (SHAFT LIMITS AT +59, -70 DEGS)

 0041  REF   1             4354  3 4374 0           CAF     5.5DEGS
 0042  REF  16 LAST 153    4355  6 0062 0           AD      ITEMP2      S
 0043  REF   2 LAST 169    4356  0 4323 1           TC      MAGSUB
 0044                      4357   64420 0           DEC     -.35833     64.5 DEGS
 0045  REF  28 LAST 169    4360  0 0001 0           TC      L
 0046  REF   1             4361  0 4372 0           TC      RRLIMOK     IN LIMITS.

 0047  REF   1             4362  3 4376 1  MODE2CHK CAF     82DEGS      MODE 2 IS DEFINED AS
 0048  REF  17 LAST 169    4363  6 0062 0           AD      ITEMP2          1. ABS(T) G 125 DEGS.
 0049  REF   3 LAST 169    4364  0 4323 1           TC      MAGSUB          2. ABS(S + 82 DEGS) L 57 DEGS
 0050                      4365   65673 0           DEC     -.31667             (SHAFT LIMITS AT -25, -139 DEGS)
 0051  REF  29 LAST 169    4366  0 0001 0           TC      L

 0052  REF  32 LAST 169    4367  3 0061 0           CA      ITEMP1
 0053  REF   4 LAST 169    4370  0 4323 1           TC      MAGSUB
 0054                      4371   51615 1           DEC     -.69444     125 DEGS

 0055  REF  30 LAST 169    4372  50 001 0  RRLIMOK  INDEX   L
 0056  REF  31 LAST 169    4373  0 0001 0           TC      L           ( = TC 1)

 00565                     4374   00765 0  5.5DEGS  DEC     .03066
 0057                      4375   00707 1  5DEGS    DEC     .02777      SCALED IN HALF-REVOLUTIONS.
 0058                      4376   16450 1  82DEGS   DEC     .45556
```

L0001 RADAR LEAD-IN ROUTINES USER'S OWN PAGE NO. 3 S3 E3

```
P0059           THE FOLLOWING ROUTINE UPDATES THE TRACKER FAIL LAMP ON THE DSKY. IF EITHER:

R0061           1. N SAMPLES OF RR DATA COULD NOT BE OBTAINED FROM 5N TRIES
R0062           2. N SAMPLES OF LR DATA COULD NOT BE TAKEN IN 2N TRIES WITH EITHER THE ALT OR VEL INFORMATION.
R0064           3. RR CDU FAILED WITH RR IN AUTO MODE AND RR CDU NOT BEING ZEROED.

0066  REF  10 LAST 155      4377  3 7763 1  SETTRKF  CAF   BIT1          NO ACTION IF DURING LAMP TEST.
0067  REF  10 LAST 146      4400  7 0366 0           MASK  IMODES33
0068  REF  97 LAST 169      4401  10 000 0           CCS   A
0069  REF  42 LAST 169      4402  0 0002 0           TC    Q

0070  REF   1               4403  3 4433 1           CAF   13,7,2       SEE IF CDU FAILED.
0071  REF  15 LAST 169      4404  7 0412 1           MASK  RADMODES
0072                        4405  0 0006 1           EXTEND
0073  REF   1               4406  1 4416 1           BZF   TRKFLON       CONDITION 3 ABOVE.

0074  REF  16 LAST 170      4407  4 0412 1           CS    RADMODES      SEE IF LR FAILED.
0075  REF   1               4410  7 4434 1           MASK  8,5
0076                        4411  0 0006 1           EXTEND
0077  REF   2 LAST 170      4412  1 4416 1           BZF   TRKFLON       CONDITION 2 ABOVE.

0078  REF  14 LAST 163      4413  3 7760 1           CAF   BIT4          SEE IF RR DATA FAILED.
0079  REF  17 LAST 170      4414  7 0412 1           MASK  RADMODES
0080  REF  98 LAST 170      4415  10 000 0           CCS   A
0081  REF   8 LAST 166      4416  3 7754 0  TRKFLON  CAF   BIT8
0082  REF  22 LAST 146      4417  6 0326 0           AD    DSPTAB +11D   HALF ADD DESIRED AND PRESENT STATES.
0083  REF   9 LAST 170      4420  7 7754 1           MASK  BIT8
0084                        4421  0 0006 1           EXTEND
0085  REF   2 LAST  77      4422  1 7020 0           BZF   TCQ           NO CHANGE.

0086  REF  32 LAST 169      4423  54 001 1           TS    L             INVERT BIT 8 AND SET BIT 15.
0087  REF  23 LAST 170      4424  3 0326 0           CA    DSPTAB +11D   CANT USE LXCH DSPTAB +11D (RESTART PROB)
0088                        4425  0 0006 1           EXTEND
0089  REF  33 LAST 170      4426  06 001 0           RXOR  L
0090  REF   6 LAST 122      4427  7 7743 1           MASK  POSMAX
0091  REF  12 LAST 146      4430  6 7745 0           AD    BIT15
0092  REF  24 LAST 170      4431  54 326 1           TS    DSPTAB +11D
0093  REF  43 LAST 170      4432  0 0002 0           TC    Q

0094                        4433   10102 0  13,7,2   OCT   10102
0095                        4434   00220 1  8,5      OCT   00220

0096                              4435  ENDRMODE EQUALS
```

L0001 RADAR LEAD-IN ROUTINES USER'S OWN PAGE NO. 4 S3 E3

P0097 TURNON SEQUENCE TO ZERO THE CDUS AND DETERMINE THE RR MODE.

```
0098                                10,2000          BANK    10

0099  REF   1                      10,2000  0 2013 1 RRTURNON TC      RRZEROSB
0100  REF   2 LAST 142             10,2001  0 5701 1          TC      FIXDELAY      WAIT 1 SEC BEFORE REMOVING TURN ON FLAG
0101                               10,2002   00144 0          DEC     100           SO A MONITOR REPOSITION WONT ALARM.
0102  REF   11 LAST 170            10,2003  4 7763 0          CS      BIT1
0103  REF   18 LAST 170            10,2004  7 0412 1          MASK    RADMODES
0104  REF   19 LAST 171            10,2005  54 412 1          TS      RADMODES
0105  REF   17 LAST 138            10,2006  4 0074 0          CS      STATE         SEE IF SOMEONE IS WAITING TO USE THE RR.
0106  REF   1                      10,2007  7 7755 0          MASK    RRUSEFLG
0107  REF   39 LAST 170            10,2010  10 000 0          CCS     A
0108  REF   13 LAST 156            10,2011  1 5727 1          TCF     TASKOVER

0109  REF   1                      10,2012  1 3242 1          TCF     ENDRADAR      CHECK RR CDU FAIL BEFORE EXIT.
```

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P0110 CLOSED SUBROUTINE TO ZERO THE RR CDUS.

```
0111                        10,2013  0 0006 1  RRZEROSB EXTEND
0112  REF   2 LAST 168      10,2014  23'464 0           DXCH   RRRET
0113  REF  12 LAST 171      10,2015  3 7763 1           CAF    BIT1          BIT 13 OF RADMODES MUST BE SET BEFORE
0114                        10,2016  0 0006 1           EXTEND               COMING HERE.
0115                        10,2017  05 012 1           MOR    12
0116  REF   3 LAST 171      10,2020  0 5701 1           TC     FIXDELAY
0117                        10,2021   00002 0           DEC    2

0118  REF  39 LAST 166      10,2022  3 7767 0           CAF    ZERO
0119  REF   2 LAST 134      10,2023  54 035 0           TS     OPTY
0120  REF   1               10,2024  54 036 0           TS     OPTX
0121  REF  22 LAST 164      10,2025  4 7763 0           CS     ONE           REMOVE ZEROING BIT.
0122                        10,2026  0 0006 1           EXTEND
0123                        10,2027  03 012 1           MAND   12
0124  REF   4 LAST 172      10,2030  0 5701 1           TC     FIXDELAY
0125                        10,2031   00620 0           DEC    400

0126  REF  10 LAST 167      10,2032  4 7747 0           CS     BIT13         REMOVE ZEROING IN PROCESS BIT.
0127  REF  20 LAST 171      10,2033  7 0412 1           MASK   RADMODES
0128  REF  21 LAST 172      10,2034  54 412 1           TS     RADMODES

0129  REF   3 LAST 172      10,2035  3 0035 1           CA     OPTY
0130  REF   5 LAST 169      10,2036  0 4323 1           TC     MAGSUB
0131                        10,2037   57777 1           DEC    -.5
0132                        10,2040  1 2043 0           TCF    +3            IF MODE 2.

0133  REF  40 LAST 172      10,2041  3 7767 0           CAF    ZERO
0134                        10,2042  1 2044 1           TCF    +2
0135  REF  11 LAST 169      10,2043  3 7750 1           CAF    BIT12
0136  REF  22 LAST 172      10,2044  56 412 0           XCH    RADMODES
0137  REF   1               10,2045  7 5502 1           MASK   -BIT12
0138  REF  23 LAST 172      10,2046  26 412 1           ADS    RADMODES

0139  REF   2 LAST 133      10,2047  0 4377 0           TC     SETTRKF       TRACKER LAMP MIGHT GO ON NOW.

0140  REF   3 LAST 172      10,2050  0 1464 0           TC     RRRET         DONE.

0141  REF   1                         5502  -BIT12      EQUALS -1/8          IN SPROOT
```

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P0142 SEQUENCE OF TASKS TO DRIVE THE RR TO A SAFE POSITION.

0143	REF 1		10,2051	0 2106 1	DORREPOS	TC	SETRRECR	SET UP RR CDU ERROR COUNTERS.
0144	REF 13 LAST 172		10,2052	3 7763 1		CAF	BIT1	DO AN ALARM UNLESS RR JUST TURNED ON.
0145	REF 24 LAST 172		10,2053	7 0412 1		MASK	RADMODES	
0146	REF 100 LAST 171		10,2054	10 000 0		CCS	A	
0147			10,2055	1 2060 1		TCF	+3	
0148	REF 22 LAST 167		10,2056	0 4755 1		TC	ALARM	
0149			10,2057	00501 0		OCT	501	
0150	REF 5 LAST 172		10,2060	0 5701 1		TC	FIXDELAY	
0151			10,2061	00002 0		DEC	2	
0152	REF 12 LAST 172		10,2062	3 7750 1		CAF	BIT15	MANEUVER TRUNNION ANGLE TO NOMINAL POS.
0153	REF 25 LAST 173		10,2063	7 0412 1		MASK	RADMODES	
0154	REF 101 LAST 173		10,2064	10 000 0		CCS	A	
0155	REF 13 LAST 170		10,2065	3 7745 0		CAF	BIT15	0 FOR MODE 1 AND 180 FOR MODE 2.
0156	REF 1		10,2066	0 2150 1		TC	RRTONLY	
0157	REF 13 LAST 173		10,2067	3 7750 1		CAF	BIT12	NOW PUT SHAFT IN RIGHT POSITION.
0158	REF 26 LAST 173		10,2070	7 0412 1		MASK	RADMODES	
0159	REF 102 LAST 173		10,2071	10 000 0		CCS	A	
0160	REF 1		10,2072	4 7746 1		CS	HALF	-90 FOR MODE 2.
0161	REF 1		10,2073	0 2153 1		TC	RRSONLY	
0162	REF 9 LAST 167		10,2074	4 7751 1	REPOSRPT	CS	BIT11	RETURNS HERE FROM RRIAXIS IF REMODE
A0163								REQUESTED DURING REPOSITION.
0164	REF 27 LAST 173		10,2075	7 0412 1		MASK	RADMODES	REMOVE REPOSITION BIT.
0165	REF 28 LAST 173		10,2076	54 412 1		TS	RADMODES	
0166	REF 16 LAST 166		10,2077	7 7752 1		MASK	BIT10	SEE IF SOMEONE IS WAITING TO DESIGNATE.
0167	REF 103 LAST 173		10,2100	10 000 0		CCS	A	
0168	REF 1		10,2101	1 2423 1		TCF	BEGDES	
0169	REF 12 LAST 133		10,2102	4 7762 1		CS	BIT2	IF NO FURTHER ANTENNA CONTROL REQUIRED.
0170			10,2103	0 0006 1		EXTEND		REMOVE ERROR COUNTER ENABLE.
0171			10,2104	03 012 1		WAND	12	
0172	REF 14 LAST 171		10,2105	1 5727 1		TCF	TASKOVER	
0173	REF 13 LAST 173		10,2106	3 7762 0	SETRRECR	CAF	BIT2	SET UP RR ERROR COUNTERS.
0174			10,2107	0 0006 1		EXTEND		
0175			10,2110	05 012 1		WOR	12	
0176	REF 41 LAST 172		10,2111	3 7767 0		CAF	ZERO	
0177	REF 4 LAST 111		10,2112	54 361 1		TS	LASTYCMD	
0178	REF 4 LAST 110		10,2113	54 362 1		TS	LASTXCMD	
0179	REF 44 LAST 170		10,2114	0 0002 0		TC	Q	

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P0180 GENERAL REMODING SUBROUTINE. DRIVES TRUNION TO 0 (180), THEN DRIVES SHAFT TO -45, AND FINALLY DRIVES
R0182 TRUNNION TO -130 (-50) BEFORE INITIATING 2-AXIS CONTROL. ALL RE-MODING IS DONE WITH SINGLE AXIS ROTATIONS (SEE
R01835 RR1AXIS).

```
0184   REF  14 LAST 173   10,2115  3 7750 1  REMODE   CAF    BIT12      DRIVE TRUNNION TO 0 (180).
0185   REF  29 LAST 173   10,2116  7 0412 1            MASK   RADMODES   (ERROR COUNTER ALREADY ENABLED)
0186   REF 104 LAST 173   10,2117  10 000 0            CCS    A
0187   REF  14 LAST 173   10,2120  3 7745 0            CAF    BIT15
0188   REF   2 LAST 173   10,2121  0 2150 1            TC     RRTONLY

0189   REF   1            10,2122  3 2137 0            CAF    -45DEGSR
0190   REF   2 LAST 173   10,2123  0 2153 1            TC     RRSONLY

0191   REF  30 LAST 174   10,2124  4 0412 1            CS     RADMODES
0192   REF  15 LAST 174   10,2125  7 7750 0            MASK   BIT12
0193   REF 105 LAST 174   10,2126  10 000 0            CCS    A
0194   REF   1            10,2127  3 2141 1            CAF    -80DEGSR   GO TO T = -130 (-50).
0195   REF   1            10,2130  6 2140 0            AD     -50DEGSR
0196   REF   3 LAST 174   10,2131  0 2150 1            TC     RRTONLY

0197   REF   1            10,2132  0 2142 1            TC     RMODINV

0198   REF  20 LAST 167   10,2133  4 7746 1            CS     BIT14      END OF REMODE.
0199   REF  31 LAST 174   10,2134  7 0412 1            MASK   RADMODES
0200   REF  32 LAST 174   10,2135  54 412 1            TS     RADMODES

0201   REF   1            10,2136  0 2432 0            TC     STDESIG    BEGIN 2-AXIS CONTROL.

0202                      10,2137   70000 0  -45DEGSR  OCT    70000
02025                     10,2140   67070 1  -50DEGSR  DEC    -.27778
0203                      10,2141   61615 1  -80DEGSR  DEC    -.44444

0204   REF  33 LAST 174   10,2142  22 412 0  RMODINV   XCH    RADMODES   INVERT THE MODE STATUS.
0205   REF  16 LAST 174   10,2143  3 7750 1            CAF    BIT12
0206                      10,2144  0 0006 1            EXTEND
0207   REF  34 LAST 170   10,2145  06 001 0            RXOR   L
0208   REF  34 LAST 174   10,2146  54 412 1            TS     RADMODES
0209   REF  45 LAST 173   10,2147  0 0002 0            TC     Q
```

L0001 RADAR LEAD-IN ROUTINES USER'S OWN PAGE NO. 8 S3 E3

P0210 SUBROUTINES FOR DOING SINGLE AXIS RR MANEUVERS FOR REMODE AND REPOSITION. DRIVES TO WITHIN 1 DEGREE.

```
0212  REF   1                10,2150  55'465 0  RRTONLY  TS      RDES        DESIRED TRUNION ANGLE.
0213  REF  42 LAST 173       10,2151  3 7767 0           CAF     ZERO
0214  REF   1                10,2152  1 2155 0           TCF     RR1AXIS

0215  REF   2 LAST 175       10,2153  55'465 0  RRSONLY  TS      RDES        SHAFT COMMANDS ARE UNRESOLVED SINCE THIS
0216  REF  23 LAST 172       10,2154  3 7763 1           CAF     ONE         ROUTINE ENTERED ONLY WHEN T = 0 OR 180.

0217  REF   1                10,2155  55'466 0  RR1AXIS  TS      RRINDEX
0218                         10,2156  0 0006 1           EXTEND
0219  REF   4 LAST 172       10,2157  23'464 0           DXCH    RRRET
0220  REF   1                10,2160  1 2163 0           TCF     RR1AX2

0221  REF   6 LAST 173       10,2161  0 5701 1  NXTRR1AX TC      FIXDELAY
0222                         10,2162   00062 0           DEC     50          2 SAMPLES PER SECOND.

0223  REF  35 LAST 174       10,2163  4 0412 1  RR1AX2   CS      RADMODES    IF SOMEONE REQUESTES AS DESIGNATE WHICH
0224  REF   1                10,2164  7 5645 1           MASK    PRIO22      REQUIRES A REMODE AND A REPOSITION IS IN
0225                         10,2165  0 0006 1           EXTEND              PROGRESS, INTERRUPT IT AND START THE
0226  REF   1                10,2166  1 2074 1           BZF     REPOSRPT    REMODE IMMEDIATELY.

0227  REF   3 LAST 175       10,2167  3 1465 1           CA      RDES
0228                         10,2170  0 0006 1           EXTEND
0229  REF   2 LAST 175       10,2171  5 1466 1           INDEX   RRINDEX
0230  REF   4 LAST 172       10,2172  20 035 0           MSU     OPTY
0231  REF  46 LAST 174       10,2173  54 002 1           TS      Q           SAVE ERROR SIGNAL.
0232                         10,2174  0 0006 1           EXTEND
0233  REF   1                10,2175  7 2212 0           MP      RRSPGAIN    TRIES TO NULL .7 OF ERROR OVER NEXT .5
0234  REF  35 LAST 174       10,2176  54 001 1           TS      L
0235  REF  47 LAST 175       10,2177  3 0002 0           CA      Q           SEE IF WITHIN 1 DEGREE.
0236  REF   6 LAST 172       10,2200  0 4323 1           TC      MAGSUB
0237                         10,2201   77644 1           DEC     -.00555     SCALED IN HALF-REVS.

0238                         10,2202  1 2204 1           TCF     +2          NO.
0239  REF   5 LAST 175       10,2203  0 1464 0           TC      RRRET       RETURN TO CALLER.

0240  REF   3 LAST 175       10,2204  11'466 0           CCS     RRINDEX     COMMAND FOR OTHER AXIS IS ZERO.
0241                         10,2205  1 2207 1           TCF     +2          SETTING A TO 0.
0242  REF  36 LAST 175       10,2206  56 001 0           XCH     L
0243  REF   2 LAST  24       10,2207  52 423 0           DXCH    TANG

0244  REF   1                10,2210  0 2213 0           TC      RRDJT

0245  REF   1                10,2211  1 2161 1           TCF     NXTRR1AX    COME BACK IN .5 SECONDS.

0246                         10,2212   22715 1  RRSPGAIN DEC     .59062      NULL .7 ERROR IN .5 SEC.
```

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P0247 THE FOLLOWING ROUTINE RECEIVES RR GYRO COMMANDS IN TANG,+1 IN ERROR COUNTER SCALING. RROUT LIMITS THEM
R0249 AND GENERATES COMMANDS TO THE CDU TO ADJUST THE ERROR COUNTERS TO THE DESIRED VALUES. RUPT MUST BE INHIBITED.

```
0251  REF  48 LAST 175   10,2213  22 002 0  RROUT     LXCH  Q          SAVE RETURN.
0252  REF  24 LAST 175   10,2214  3 7763 1            CAF   ONE        LOOP TWICE.
0253  REF  18 LAST 169   10,2215  54 062 1  RROUT2    TS    ITEMP2
0254  REF 106 LAST 174   10,2216  50 000 1            INDEX A
0255  REF   3 LAST 175   10,2217  3 0422 0            CA    TANG
0256  REF  33 LAST 169   10,2220  54 061 1            TS    ITEMP1     SAVE SIGN OF COMMAND FOR LIMITING.

0257  REF   7 LAST 175   10,2221  0 4323 1            TC    MAGSUB     SEE IF WITHIN LMITS.
0258                     10,2222   77177 0  -RRLIMIT  DEC   -384
0259  REF   1            10,2223  1 2242 0            TCF   RROUTLIM   LIMIT COMMAND TO MAG OF 384.

0260  REF  34 LAST 176   10,2224  3 0061 0  SETRRCTR  CA    ITEMP1     COUNT OUT DIFFERENCE BETWEEN DESIRED
0261  REF  19 LAST 176   10,2225  50 062 0            INDEX ITEMP2     STATE AND PRESENT STATE AS RECORDED IN
0262  REF   5 LAST 173   10,2226  56 361 0            XCH   LASTYCMD   LASTYCMD AND LASTXCMD
0263                     10,2227  4 0000 0            COM
0264  REF  35 LAST 176   10,2230  6 0061 0            AD    ITEMP1
02645 REF   3 LAST 142   10,2231  6 7770 0            AD    NEGO
0265  REF  20 LAST 176   10,2232  50 062 0            INDEX ITEMP2
0266  REF   2 LAST 110   10,2233  54 053 0            TS    OPTYCMD

0267  REF  21 LAST 176   10,2234  10 062 1            CCS   ITEMP2     PROCESS BOTH INPUTS.
0268  REF   1            10,2235  1 2215 1            TCF   RROUT2

0269  REF   1            10,2236  3 5634 0            CAF   PRIO6      ENABLE COUNTERS.
0270                     10,2237  0 0006 1            EXTEND
0271                     10,2240  05 014 1            WOR   14

0272  REF  37 LAST 175   10,2241  0 0001 0            TC    L          RETURN.

0273  REF  36 LAST 176   10,2242  10 061 1  RROUTLIM  CCS   ITEMP1     LIMIT COMMAND TO ABS VAL OF 384.
0274  REF   1            10,2243  4 2222 0            CS    -RRLIMIT
0275                     10,2244  1 2246 1            TCF   +2
0276  REF   2 LAST 176   10,2245  3 2222 1            CA    -RRLIMIT
0277  REF  37 LAST 176   10,2246  54 061 1            TS    ITEMP1
0278  REF   1            10,2247  1 2225 1            TCF   SETRRCTR +1
```

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P0279 ROUTINE TO ZERO THE RR CDUS AND DETERMINE THE ANTENNA MODE.

```
0280                          10,2250  0 0004 0  RRZERO   INHINT
0281  REF   2 LAST 171       10,2251  4 7755 0           CS      RRJSEFLG     SET FLAG TO SHOW SOMEONE USING THE RR.
0282  REF  18 LAST 171       10,2252  7 0074 0           MASK    STATE
0283  REF   3 LAST 177       10,2253  6 7755 1           AD      RRJSEFLG
0284  REF  19 LAST 177       10,2254  54 074 0           TS      STATE

0285  REF  14 LAST 173       10,2255  3 7763 1           CAF     BIT1         SEE IF RR COMING UP. IF SO, TURNON
0286  REF  36 LAST 175       10,2256  7 0412 1           MASK    RADMODES     PROGRAM WILL DO THE WORK.
0287  REF 107 LAST 176       10,2257  10 000 0           CCS     A
0288  REF   1                10,2260  1 2303 1           TCF     ROADBACK

0289  REF  10 LAST 173       10,2261  3 7751 0           CAF     BIT11        SEE IF MONITOR REPOSITION IN PROGRESS.
0290  REF  37 LAST 177       10,2262  7 0412 1           MASK    RADMODES     IF SO, DONT RE-ZERO CDUS.
0291  REF 108 LAST 177       10,2263  10 000 0           CCS     A
0292  REF   1                10,2264  1 3224 1           TCF     RADNOOP      (IMMEDIATE TASK TO RGOODEND).

0293  REF  11 LAST 172       10,2265  4 7747 0           CS      BIT13        SET FLAG TO SHOW ZEROING IN PROGRESS.
0294  REF  38 LAST 177       10,2266  7 0412 1           MASK    RADMODES
0295  REF  12 LAST 177       10,2267  6 7747 1           AD      BIT13
0296  REF  39 LAST 177       10,2270  54 412 1           TS      RADMODES

0297  REF  25 LAST 176       10,2271  3 7763 1           CAF     ONE
0298  REF  17 LAST 162       10,2272  0 5663 1           TC      WAITLIST
02985 REF   6 LAST 175                     E3           EBANK=  RRRET
0299                          10,2273    02305 0         2CADR   RRZ2
C0299 REF   1                 10,2274    20063 0
0300  REF  40 LAST 177       10,2275  4 0412 1           CS      RADMODES     SEE IF IN AUTO MODE.
0301  REF  14 LAST 173       10,2276  7 7762 1           MASK    BIT2
0302  REF 109 LAST 177       10,2277  10 000 0           CCS     A
0303  REF   2 LAST 177       10,2300  1 2303 1           TCF     ROADBACK
0304  REF  23 LAST 173       10,2301  0 4755 1           TC      ALARM        AUTO DISCRETE NOT PRESENT - TRYING
0305                          10,2302    00510 0         OCT     510
0306                          10,2303  0 0003 1  ROADBACK RELINT
0307  REF   5 LAST 159       10,2304  1 5221 1           TCF     SWRETURN

0308  REF   2 LAST 171       10,2305  0 2013 1  RRZ2     TC      RRZEROSB     COMMON TO TURNON AND RRZERO.
0309  REF   2 LAST 171       10,2306  1 3242 1           TCF     ENDRADAR

0310  REF  10 LAST 166                 7755    RRUSEFLG EQUALS BIT7
0311  REF   7 LAST 163                 7757    LOKONFLG EQUALS BIT5
```

L0001 RADAR LEAD-IN ROUTINES USER'S OWN PAGE NO. 11 S3 E3

P0312 STABLE-MEMBER RR DESIGNATE ROUTINE. DESIGNATE TO A SM LOS VECTOR (HALF-UNIT) IN RRTARGET. REMODES IF
R0314 REQUIRED. RETURNS TO CALLER IF MANEUVER REQUIRED FOR DES AND SKIPS IF IT CAN BE DONE IN PRESENT VEH ATTITUDE.

```
0316                        10,2307  43020 1  RRDESSM  STQ     CLEAR
0317  REF  2 LAST  24       10,2310  00426 1           DESRET
0318  REF  1                10,2311  00271 0           RRNBSW
0319                        10,2312  66234 1  RTB      SSP     READ CDUS FOR SMNB.
0320  REF  1                10,2313  33473 1           READCDUS
0321  REF  1                10,2314  00051 0           S1
0322                        10,2315  00024 1           2OD
0323                        10,2316  24025 0  STOVL    2OD
0324  REF  1                10,2317  00415 1           RRTARGET
0325                        10,2320  34041 0  STCALL   32D
0326  REF  1                10,2321  32531 1           SMNB

0327                        10,2322  77624 1  CALL                GET RR GIMBAL ANGLES IN PRESENT AND
0328  REF  1                10,2323  33355 1           RRANGLES    ALTERNATE MODE.
0329                        10,2324  77776 1  EXIT

0330                        10,2325  0 0004 0 INHINT
0331  REF  2 LAST 134       10,2326  0 4334 1 TC       RRLIMCHK
0332  REF  1                10,2327   00422 0 ADRES    MODEA       CONFIGURATION FOR CURRENT MODE.
0333  REF  1                10,2330  1 2352 0 TCF      TRYSWS

0334  REF  3 LAST 178       10,2331  24 426 1 DESSM    INCR    DESRET      INCREMENT SAYS NO VEHICLE MANEUVER REQ.
```

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```
P0335           AT THIS POINT WE ARE READY TO BEGIN DESIGNATION. THE TARGET IS STORED AS A HALF-UNIT VECTOR IN RRTARGET
R0337  WITH RRNBSW SET IF IT IS REFERRED TO NAV BASE AXES. LOKONSW IS SET IF LOCKON IS DESIRED. BIT14 OF RADMODES IS
R0339  SET IF A REMODE IS REQUIRED. AT THIS TIME, THE ANTENNA MAY BE IN A MONITOR REPOSITION OPERATION. IN THIS
R0341  CASE, IF A REMODE IS REQUIRED IT MAY HAVE ALREADY BEGUN BUT IT ANY CASE THE REPOSITION WILL BE INTERRUPTED.
R0343  OTHERWISE, THE REPOSITION WILL BE COMPLETED BEFORE 2-AXIS DESIGNATION BEGINS.

 0345   REF   1                 10,2332  3 2351 1  STARTDES  CAF    MAXTRIES      ALLOW 30 SECS.
 0346   REF   1                 10,2333  54 427 1            TS     DESCOUNT

 0347   REF  17 LAST 173        10,2334  3 7752 0            CAF    BIT10         SHOW DESIGNATE REQUIRED.
 0348   REF  41 LAST 177        10,2335  26 412 1            ADS    RADMODES
 0349   REF  11 LAST 177        10,2336  7 7751 1            MASK   BIT11         SEE IF REPOSITION IN PROGRESS.
 0350   REF 110 LAST 177        10,2337  10 000 0            CCS    A
 0351   REF   1                 10,2340  1 2346 0            TCF    DESRETRN      ECTR ALREADY SET UP.

 0352   REF   2 LAST 173        10,2341  0 2106 1            TC     SETRRECR      SET UP ERROR COUNTERS.

 0353   REF  12 LAST 159        10,2342  3 7762 0            CAF    TWO
 0354   REF  18 LAST 177        10,2343  0 5663 1            TC     WAITLIST
 03545  REF   7 LAST 177                   E3                EBANK= RRRET
 0355                           10,2344    02423 0           2CADR  BEGDES
C0355   REF   2 LAST 173        10,2345    20063 0
 0356                           10,2346  0 0003 1  DESRETRN  RELINT                 RETURN VIA DESRET
 0357   REF   4 LAST 178        10,2347  3 0426 1    +1      CA     DESRET
 0358   REF   2 LAST  77        10,2350  1 5230 1            TCF    BANKJUMP

 0359                           10,2351   00074 1  MAXTRIES  DEC    60
```

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P0360 SEE IF RRDESSM CAN BE ACCOMPLISHED AFTER A REMODE.

```
0361  REF   2 LAST 174    10,2352  0 2142 1  TRYSWS   TC     RMODINV     (NOTE RUPT INHIBIT)
0362  REF   3 LAST 178    10,2353  0 4334 1           TC     RRLIMCHK    TRY DIFFERENT MODE.
0363  REF   2 LAST  24    10,2354    00424 0          ADRES  MODEB
0364  REF   1              10,2355  1 2362 0          TCF    NODESSM     VEHICLE MANEUVER REQUIRED.

0365  REF   3 LAST 180    10,2356  0 2142 1          TC     RMODINV     RESET BIT12
0366  REF  21 LAST 174    10,2357  3 7746 0          CAF    BIT14       SET FLAG FOR REMODE.
0367  REF  42 LAST 179    10,2360  26 412 1          ADS    RADMODES

0368  REF   1              10,2361  1 2331 0          TCF    OKDESSM

0369  REF   4 LAST 180    10,2362  0 2142 1  NODESSM  TC     RMODINV     RE-INVERT MODE AND RETURN WITHOUT IN-
0370  REF   2 LAST 179    10,2363  1 2346 0          TCF    DESRETRN    CREMENTING DESRET
```

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P0371 DESIGNATE TO SPECIFIC RR GIMBAL ANGLES (INDEPENDENT OF VEHICLE MOTION). ENTER WITH DESIRED ANGLES IN
R0373 TANG AND TANG +1.

```
 0374   REF   2 LAST 157      10,2364  0 5235 0  RRDESNB   TC      MAKEADR
 0375   REF   5 LAST 179      10,2365  54 426 0            TS      DESRET

 0376                         10,2366  0 0004 0            INHINT                  SEE IF CURRENT MODE OK.
 0377   REF   4 LAST 180      10,2367  0 4334 1            TC      RRLIMCHK
 0378   REF   4 LAST 176      10,2370   00422 0            ADRES   TANG
 0379   REF   1               10,2371  1 2403 0            TCF     TRYSWN          SEE IF IN OTHER MODE.

 0380                         10,2372  0 0003 1  OKDESNB   RELINT
 0381   REF   1               10,2373  0 6112 0            TC      INTPRET

 0382                         10,2374   77624 1            CALL                    GET LOS IN NB COORDS.
 0383   REF   1               10,2375   33430 0                    RRNB
 0384   REF   2 LAST 178      10,2376   00415 1            STORE   RRTARGET

 0385                         10,2377   77414 0            SET     EXIT
 0386   REF   2 LAST 178      10,2400   00071 1                    RRNBSW

 0387                         10,2401  0 0004 0            INHINT
 0388   REF   1               10,2402  1 2332 0            TCF     STARTDES

 0389   REF   5 LAST 180      10,2403  0 2142 1  TRYSWN    TC      RMODINV         SEE IF OTHER MODE WILL DO.
 0390   REF   5 LAST 181      10,2404  0 4334 1            TC      RRLIMCHK
 0391   REF   5 LAST 181      10,2405   00422 0            ADRES   TANG
 0392   REF   1               10,2406  1 2413 1            TCF     NODESNB         NOT POSSIBLE.

 0393   REF   6 LAST 181      10,2407  0 2142 1            TC      RMODINV
 0394   REF  22 LAST 180      10,2410  3 7746 0            CAF     BIT14           CALL FOR REMODE.
 0395   REF  43 LAST 180      10,2411  26 412 1            ADS     RADMODES
 0396   REF   1               10,2412  1 2372 1            TCF     OKDESNB

 0397   REF  15 LAST 177      10,2413  3 7763 1  NODESNB   CAF     BIT1            CALL FOR ERROR RETURN.
 0398   REF  19 LAST 179      10,2414  0 5663 1            TC      WAITLIST
 03985  REF   8 LAST 179                 E3                EBANK=  RRRET
 0399                         10,2415   03256 0            2CADR   RDBADEND
C0399   REF   1               10,2416   20063 0
 0400   REF   7 LAST 181      10,2417  0 2142 1            TC      RMODINV
 0401   REF  24 LAST 177      10,2420  0 4755 1            TC      ALARM           BAD GIMBAL ANGLE INPUTS.
 0402                         10,2421   00502 0            OCT     502
 0403   REF   3 LAST 180      10,2422  1 2347 1            TCF     DESRETRN +1     ALARM DID A RELINT.
```

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P0404 WAITLIST TASKS TO RUN RR DESIGNATION.

```
0405  REF  23 LAST 181   10,2423  3 7746 0  BEGDES   CAF    BIT14      ENTER HERE FROM STARTDES OR REPOSRPT.
0406  REF  44 LAST 181   10,2424  7 0412 1            MASK   RADMODES   SEE IF REMODE REQUIRED.
0407  REF 111 LAST 179   10,2425  10 000 0            CCS    A
0408  REF   1            10,2426  1 2115 1            TCF    REMODE
0409  REF   2 LAST 174   10,2427  1 2432 1            TCF    STDESIG

0410  REF   7 LAST 175   10,2430  0 5701 1  DESLOOP   TC     FIXDELAY   2 SAMPLES PER SECOND.
0411                     10,2431   00062 0            DEC    50

0412  REF  12 LAST 179   10,2432  3 7751 0  STDESIG   CAF    BIT11      ENTRY FROM BEGDES AND REMODE.
0413  REF  45 LAST 182   10,2433  7 0412 1            MASK   RADMODES   SEE IF GIMBAL LIMIT MONITOR HAS FOUND US
0414  REF 112 LAST 182   10,2434  10 000 0            CCS    A          OUT OF BOUNDS. IF SO, THIS BIT SHOWS A
0415  REF   1            10,2435  1 2455 0            TCF    BADDES     REPOSITION TO BE IN PROGRESS.

0416  REF  46 LAST 182   10,2436  10 412 1            CCS    RADMODES   SEE IF CONTINUOUS DESIGNATE WANTED.
0417                     10,2437  1 2442 0            TCF    +3         IF SO, DONT CHECK BIT 10 TO SEE IF IN
0418                     10,2440  1 2442 0            TCF    +2         LIMITS BUT GO RIGHT TO FINDVAC ENTRY.
0419  REF   1            10,2441  1 2462 1            TCF    MOREDES +1

0420  REF  47 LAST 182   10,2442  4 0412 1            CS     RADMODES   IF NON-CONTINUOUS, SEE IF END OF
0421  REF  18 LAST 179   10,2443  7 7752 1            MASK   BIT10      PROBLEM (DATA GOOD IF LOCK-ON WANTED OR
0422  REF 113 LAST 182   10,2444  10 000 0            CCS    A          WITHIN LIMITS IF NOT). IF SO, EXIT AFTER
0423  REF   3 LAST 177   10,2445  1 3242 1            TCF    ENDRADAR   CHECKING RR CDU FAIL.

0424  REF   2 LAST 179   10,2446  10 427 1            CCS    DESCOUNT   SEE IF TIME LIMIT HAS EXPIRED.
0425  REF   2 LAST 182   10,2447  1 2461 1            TCF    MOREDES

0426  REF  25 LAST 181   10,2450  0 4755 1            TC     ALARM      OUT OF TIME.
0427                     10,2451   00503 1            OCT    503
0428  REF   1            10,2452  4 2467 1            CS     B14+B2     IF OUT OF TIME, REMOVE ECR ENABLE + TRKR
0429                     10,2453  0 0006 1            EXTEND
0430                     10,2454  03 012 1            WAND   12
0431  REF  19 LAST 182   10,2455  4 7752 1  BADDES    CS     BIT10      REMOVE DESIGNATE FLAG.
0432  REF  48 LAST 182   10,2456  7 0412 1            MASK   RADMODES
0433  REF  49 LAST 182   10,2457  54 412 1            TS     RADMODES
0434  REF   2 LAST 181   10,2460  1 3256 1            TCF    RDBADEND

0435  REF   3 LAST 182   10,2461  54 427 1  MOREDES   TS     DESCOUNT
0436  REF   1            10,2462  3 5650 1            CAF    PRIO26     UPDATE GYRO TORQUE COMMANDS.
0437  REF   4 LAST  88   10,2463  0 5516 0            TC     FINDVAC
04375 REF   9 LAST 181                 E3            EBANK= RRRET
0438                     10,2464   02470 0            2CADR  DODES
C0438 REF   1            10,2465   20063 0
0439  REF   1            10,2466  1 2430 0            TCF    DESLOOP

0440                     10,2467   20002 1  B14+B2    OCT    20002
```

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P0441 CALCULATE GYRO TORQUE COMMANDS.

```
0442                        10,2470  0 0006 1  DODES    EXTEND
0443  REF  5 LAST 175       10,2471  3 0036 1           DCA     OPTY
0444  REF  6 LAST 181       10,2472  52 423 0           DXCH    TANG

0445  REF  2 LAST 181       10,2473  0 6112 0           TC      INTPRET

0446                        10,2474  77775 1            vLOAD                   MOVE TARGET VECTOR TO 32D.
0447  REF  3 LAST 181       10,2475  00415 1                   RRTARGET
0448                        10,2476  00041 1            STORE   32D

0449                        10,2477  47014 1            BON     RTB             DO STABLE-MEMBER TO NAVBASE TRANSFORMA-
0450  REF  3 LAST 181       10,2500  00311 1                   RRNBSW          TION IF TARGET IN SM COORDS, OTHERWISE,
0451  REF  1                10,2501  20510 1                   DONBRD          IN NB COORDS ALREADY.
0452  REF  2 LAST 178       10,2502  33473 1                   READCDUS

0453                        10,2503  77731 1            SSP
0454  REF  2 LAST 178       10,2504  00051 0                   S1
0455                        10,2505  00024 1                   20D             LOC OF ICDUS.
0456                        10,2506  34025 1            STCALL  20D
0457  REF  2 LAST 178       10,2507  32531 1                   SMNB
```

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```
0458                        10,2510  67201 0  DONBRD  SETPD   SLOAD          DO NAVBASE TO RADAR DISH TRANSFORMATION.
0459                        10,2511  00001 0           0
0460  REF  7 LAST 183       10,2512  00424 0           TANG +1
0461                        10,2513  41434 1  RTB      PUSH                   SHAFT COMMAND = V(32D).(COS(S), 0,
0462  REF  1                10,2514  33457 1           CDULOGIC                     (-SIN(S)).
0463                        10,2515  65356 1  SIN      PDDL                   SIN(S) TO 0 AND COS(S) TO 2.
0464                        10,2516  41546 0  COS      PUSH
0465                        10,2517  65205 0  DMP      PDDL
0466                        10,2520  00041 1           32D
0467                        10,2521  00045 0           36D
0468                        10,2522  44205 0  DMP      BDSU
0469                        10,2523  00001 0           0
0470                        10,2524  77626 0  STADR
0471  REF  8 LAST 184       10,2525  77353 1  STORE    TANG +1                SHAFT COMMAND

0472                        10,2526  47135 0  SLOAD    RTB
0473  REF  9 LAST 184       10,2527  00423 1           TANG
0474  REF  2 LAST 184       10,2530  33457 1           CDULOGIC
0475                        10,2531  71406 0  PUSH     COS                    COS(T) TO 4.
0476                        10,2532  73525 1  PDDL     SIN
0477                        10,2533  41206 0  PUSH     DMP                    SIN(T) TO 6.
0478                        10,2534  00003 1           2
0479                        10,2535  65352 0  SL1      PDDL                   DEFINE VECTOR U = (SIN(T)SIN(S))
0480                        10,2536  00005 1           4                                        (COS(T)      )
0481                        10,2537  41325 0  PDDL     DMP                                      (SIN(T)COS(S))
0482                        10,2540  00007 0           6
0483                        10,2541  00001 0           0
0484                        10,2542  55552 0  SL1      VDEF
0485                        10,2543  77441 0  DOT      EXIT                   DOT U WITH LOS TO GET TRUNNION COMMAND.
0486                        10,2544  00041 1           32D
```

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P0487 AT THIS POINT WE HAVE A ROTATION VECTOR IN DISH AXES LYING IN THE TS PLANE. CONVERT THIS TO A
R0489 COMMANDED RATE AND ENABLE THE TRACKER IF WE ARE WITHIN 1 DEGREE OF THE TARGET.

0491	REF 54 LAST 166	10,2545	4 0144 1		CS	MPAC	DOT WAS NEGATIVE OF DESIRED ANGLE.
0492	REF 10 LAST 184	10,2546	54 422 1		TS	TANG	
0493	REF 50 LAST 182	10,2547	4 0412 1		CS	RADMODES	A RELAY IN THE RR REVERSES POLARITY OF
0494	REF 17 LAST 174	10,2550	7 7750 0		MASK	BIT12	THE SHAFT COMMANDS IN MODE 2 SO THAT A
0495	REF 114 LAST 182	10,2551	10 000 0		CCS	A	POSITIVE TORQUE APPLIED TO THE SHAFT
0496		10,2552	1 2555 1		TCF	+3	GYRO CAUSES A POSITIVE CHANGE IN THE
0497	REF 11 LAST 185	10,2553	4 0423 0		CS	TANG +1	SHAFT ANGLE. COMPENSATE FOR THIS SWITCH
0498	REF 12 LAST 185	10,2554	54 423 0		TS	TANG +1	BY CHANGING THE POLARITY OF OUR COMMAND.
0499	REF 43 LAST 175	10,2555	3 7767 0		CAF	ZERO	
0500	REF 55 LAST 185	10,2556	54 145 0		TS	MPAC +1	
0501	REF 26 LAST 177	10,2557	3 7763 1		CAF	ONE	
0502	REF 56 LAST 185	10,2560	54 144 1	RRSCALUP	TS	MPAC	
0503	REF 115 LAST 185	10,2561	50 000 1		INDEX	A	
0504	REF 13 LAST 185	10,2562	3 0422 0		CA	TANG	TRUNNION COMPONENT OF ROTATION.
0505		10,2563	0 0006 1		EXTEND		
0506	REF 1	10,2564	7 2636 1		MP	RDESGAIN	SCALING ON INPUT ANGLE WAS 4 RADIANS.
0507	REF 57 LAST 185	10,2565	50 144 0		INDEX	MPAC	
0508	REF 14 LAST 185	10,2566	56 422 0		XCH	TANG	MAKE EACH COMPONENT LESS THAN .7 DEGREES
0509	REF 8 LAST 176	10,2567	0 4323 1		TC	MAGSUB	BEFORE SENDING TRACK ENABLE.
0510		10,2570	77715 1		DEC	-.00305	
0511	REF 58 LAST 185	10,2571	24 145 1		INCR	MPAC +1	IF OUT OF BOUNDS.
0512	REF 59 LAST 185	10,2572	10 144 1		CCS	MPAC	
0513	REF 1	10,2573	1 2560 1		TCF	RRSCALUP	

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P0514 SEE IF TRACKER SHOULD BE ENABLED OR DISABLED.

```
0515                          10,2574  0 0004 0          INHINT

0516  REF  51 LAST 185       10,2575  10 412 1          CCS   RADMODES     IF CONTINUOUS DESIGNATE WANTED, PUT OUT
0517                          10,2576  1 2601 0          TCF   +3           COMMANDS WITHOUT CHECKING MAGNITUDE OF
0518                          10,2577  1 2601 0          TCF   +2           ERROR SIGNALS.
0519  REF   1                 10,2600  1 2626 0          TCF   TRKOFF

0520  REF  60 LAST 185        10,2601  10 145 0          CCS   MPAC +1      SEE IF BOTH AXES WERE WITHIN .7 DEGS.
0521  REF   2 LAST 186        10,2602  1 2626 0          TCF   TRKOFF

0522  REF  20 LAST 177        10,2603  4 0074 0          CS    STATE        IF WITHIN LIMITS AND NO LOCK-ON WANTED,
0523  REF   1                 10,2604  7 7757 1          MASK  LOKONFLG     PROBLEM IS FINISHED.
0524  REF 116 LAST 185        10,2605  10 000 0          CCS   A
0525  REF   1                 10,2606  1 2617 1          TCF   RRDESDUN

0526  REF  24 LAST 182        10,2607  3 7746 0          CAF   BIT14        ENABLE THE TRACKER.
0527                          10,2610  0 0006 1          EXTEND
0528                          10,2611  05 012 1          WOR   12

0529  REF  15 LAST 170        10,2612  3 7760 1          CAF   BIT4         SEE IF DATA GOOD RECEIVED YET.
0530                          10,2613  0 0006 1          EXTEND
0531                          10,2614  02 033 0          RAND  33
0532  REF 117 LAST 186        10,2615  10 000 0          CCS   A
0533  REF   1                 10,2616  1 2631 0          TCF   DORROUT

0534  REF  20 LAST 182        10,2617  4 7752 1  RRDESDUN CS    BIT10        WHEN PROBLEM DONE, REMOVE BIT 10 SO NEXT
0535  REF  52 LAST 186        10,2620  7 0412 1          MASK  RADMODES     WAITLIST TASK WE WILL GO TO RGOODEND.
0536  REF  53 LAST 186        10,2621  54 412 1          TS    RADMODES

0537  REF  15 LAST 177        10,2622  4 7762 1          CS    BIT2
0538                          10,2623  0 0006 1          EXTEND
0539                          10,2624  03 012 1          WAND  12
0540  REF   7 LAST 166        10,2625  1 5567 1          TCF   ENDOFJOB     WITH ECTR DISABLED.

0541  REF  25 LAST 186        10,2626  4 7746 1  TRKOFF   CS    BIT14
0542                          10,2627  0 0006 1          EXTEND
0543                          10,2630  03 012 1          WAND  12

0544  REF  54 LAST 186        10,2631  4 0412 1  DORROUT  CS    RADMODES     PUT OUT COMMAND UNLESS MONITOR
0545  REF  13 LAST 182        10,2632  7 7751 1          MASK  BIT11        REPOSITION HAS TAKEN OVER.
0546  REF 118 LAST 186        10,2633  10 000 0          CCS   A
0547  REF   2 LAST 175        10,2634  0 2213 0          TC    RROUT

0548  REF   8 LAST 186        10,2635  1 5567 1          TCF   ENDOFJOB

0549                          10,2636   21122 0  RDESGAIN DEC   .53624      TRIES TO NULL .5 ERROR IN .5 SEC.
```

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P0550 RADAR READ INITIALIZATION

R0551 RADAR DATA ARE READ BY A BANKCALL FOR THE APPROPRIATE LEAD-IN BELOW.

```
0552  REF  1              10,2637  0 2653 0  LRALT    TC    INITREAD -1    ONE SAMPLE PER READING.
0553                      10,2640    00017 1  ALLREAD  OCT   17

0554  REF  2 LAST 187     10,2641  0 2654 1  LRVELZ   TC    INITREAD
0555                      10,2642    00016 0           OCT   16

0556  REF  3 LAST 187     10,2643  0 2654 1  LRVELY   TC    INITREAD
0557                      10,2644    00015 0           OCT   15

0558  REF  4 LAST 187     10,2645  0 2654 1  LRVELX   TC    INITREAD
0559                      10,2646    00014 1           OCT   14

0560  REF  5 LAST 187     10,2647  0 2653 0  RRRDOT   TC    INITREAD -1
0561                      10,2650    00012 1           OCT   12

0562  REF  6 LAST 187     10,2651  0 2653 0  RRRANGE  TC    INITREAD -1
0563                      10,2652    00011 1           OCT   11
```

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```
0564  REF  27 LAST 185     10,2653  3 7763 1   -1       CAF    ONE          ENTRY TO TAKE ONLY 1 SAMPLE.
0565                       10,2654  0 0004 0   INITREAD INHINT
0566  REF   1              10,2655  54 420 0              TS     TIMEHOLD     GET DT OF MIDPOINT OF NOMINAL SAMPLING
0567                       10,2656  0 0006 1              EXTEND              INTERVAL (ASSUMES NO BAD SAMPLES WILL BE
0568  REF   2 LAST 163     10,2657  7 7761 1              MP     BIT3         ENCOUNTERED).
0569  REF   2 LAST 188     10,2660  52 421 1              DXCH   TIMEHOLD
0570  REF 119 LAST 186     10,2661  10 000 0              CCS    A
0571  REF   1              10,2662  54 424 1              TS     NSAMP
0572  REF  28 LAST 188     10,2663  6 7763 1              AD     ONE
R0573          INSERT FOLLOWING INSTRUCTION TO GET 2N TRIES FOR N SAMPLES.
A0574                                                    DOUBLE
0575  REF   2 LAST  98     10,2664  54 413 0              TS     SAMPLIM
0576  REF   1              10,2665  3 2707 0              CAF    DGBITS       READ CURRENT VALUE OF DATA GOOD BITS.
0577                       10,2666  0 0006 1              EXTEND
0578                       10,2667  02 033 0              RAND   33
0579  REF   1              10,2670  54 426 0              TS     OLDATAGD
0580  REF   1              10,2671  4 2640 0              CS     ALLREAD
0581                       10,2672  0 0006 1              EXTEND
0582                       10,2673  03 013 0              WAND   13           REMOVE ALL RADAR BITS
0583  REF  49 LAST 176     10,2674  50 002 0              INDEX  Q
0584                       10,2675  3 0000 1              CAF    0
0585                       10,2676  0 0006 1              EXTEND
0586                       10,2677  05 013 0              WOR    13           SET NEW RADAR BITS
0587                       10,2700  0 0006 1              EXTEND
0588  REF   4 LAST 163     10,2701  3 0025 0              DCA    TIME2
0589  REF   3 LAST 188     10,2702  20 421 1              DAS    TIMEHOLD     TIME OF NOMINAL MIDPOINT.
0590  REF  44 LAST 185     10,2703  3 7767 0              CAF    ZERO
0591  REF  38 LAST 176     10,2704  54 001 1              TS     L
0592  REF   3 LAST  24     10,2705  52 415 0              DXCH   SAMPISUM
0593  REF   3 LAST 177     10,2706  1 2303 1              TCF    ROADBACK
0594                       10,2707   00230 0  DGBITS     OCT    230
```

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P0595 RADAR RUPT READER

R0596 THIS ROUTINE STARTS FROM A RADARUPT. IT READS THE DATA & LOTS MORE.

```
0597   REF   3 LAST 163    10,2710   54 016 1  RADAREAD TS      BANKRUPT
0598                       10,2711   0 0006 1           EXTEND
0599   REF   3 LAST 163    10,2712   22 012 1           DXCH    ZRUPT

0600                       10,2713   0 0006 1  ANGLREAD EXTEND
0601   REF   6 LAST 183    10,2714   3 0036 1           DCA     OPTY
0602   REF   1              10,2715   52 417 1           DXCH    OPTYHOLD       SAVE RAW CDU ANGLES

0603   REF   3 LAST 188    10,2716   10 413 0  TRYCOUNT CCS     SAMPTIM
0604   REF   1              10,2717   1 2731 1           TCF     PLENTY
0605   REF   1              10,2720   1 2724 0           TCF     NOMORE
0606   REF   26 LAST 182   10,2721   0 4755 1           TC      ALARM
0607                       10,2722    00520 0           OCT     520
0608   REF   10 LAST 166   10,2723   0 5733 0           TC      RESJME

0609   REF   27 LAST 189   10,2724   0 4755 1  NOMORE   TC      ALARM
0610                       10,2725    00521 1           OCT     521
0611   REF   29 LAST 188   10,2726   4 7763 0  BADRAD   CS      ONE
0612   REF   4 LAST 189    10,2727   54 413 0           TS      SAMPTIM
0613   REF   3 LAST 182    10,2730   0 3254 1           TC      RDBADEND -2

0614   REF   5 LAST 189    10,2731   54 413 0  PLENTY   TS      SAMPTIM
0615   REF   3 LAST 188    10,2732   3 7761 0           CAF     BIT3
0616                       10,2733   0 0006 1           EXTEND
0617                       10,2734   02 013 1           RAND    13             TO FIND OUT WHICH RADAR
0618                       10,2735   0 0006 1           EXTEND
0619   REF   1              10,2736   1 3015 1           BZF     RENDRAD

0620   REF   55 LAST 186   10,2737   3 0412 0  LRPOSCHK CA      RADMODES       SEE IF LR IN DESIRED POSITION.
0621                       10,2740   0 0006 1           EXTEND
0622                       10,2741   06 033 1           RXOR    33
0623   REF   15 LAST 155   10,2742   7 7756 0           MASK    BIT6
0624                       10,2743   0 0006 1           EXTEND
0625   REF   1              10,2744   1 2750 0           BZF     VELCHK

0626   REF   28 LAST 189   10,2745   0 4755 1           TC      ALARM
0627                       10,2746    00522 1           OCT     522
0628   REF   1              10,2747   0 2726 0           TC      BADRAD

0629   REF   1              10,2750   3 6311 1  VELCHK   CAF     BIN3           = 00003 OCT
0630                       10,2751   0 0006 1           EXTEND
0631                       10,2752   06 013 0           RXOR    13
0632   REF   2 LAST 189    10,2753   7 6311 0           MASK    BIN3
0633                       10,2754   0 0006 1           EXTEND
0634   REF   1              10,2755   1 3011 0           BZF     LRHEIGHT       TAKE A LR RANGE READING
```

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```
0635  REF   7 LAST 170    10,2756  3 7743 0          CAF   POSMAX
0636  REF   1             10,2757  7 0046 1          MASK  RNRAD
0637  REF   1             10,2760  6 3157 1          AD    LVELBIAS
0638  REF  39 LAST 188    10,2761  54 001 1          TS    L
0639  REF   2 LAST 190    10,2762  30 046 0          CAE   RNRAD
0640                       10,2763  6 0000 1          DOUBLE
0641  REF  16 LAST 181    10,2764  7 7763 0          MASK  BIT1
0642  REF   9 LAST 164    10,2765  52 064 1          DXCH  ITEMP3

0643  REF  10 LAST 170    10,2766  3 7754 0          CAF   BIT8          DATA GOOD ISNT CHECKED UNTIL AFTER READ-
0644  REF   1             10,2767  0 3127 0          TC    DGCHECK       ING DATA SO SOME RADAR TESTS WILL WORK
A0645                                                                   INDEPENDENT OF DATA GOOD.

0646  REF   2 LAST 188    10,2770  10 424 1          CCS   NSAMP
0647  REF   1             10,2771  0 3001 0          TC    NOEND
0648  REF  30 LAST 189    10,2772  4 7763 0  GOODRAD  CS    ONE
0649  REF   6 LAST 189    10,2773  54 413 0          TS    SAMPLIM
0650  REF  38 LAST 176    10,2774  4 0061 1          CS    ITEMP1        WHEN ENOUGH GOOD DATA HAS BEEN GATHERED,
0651  REF  56 LAST 189    10,2775  7 0412 1          MASK  RADMODES      RESET DATA FAIL FLAGS FOR SETTRKF.
0652  REF  57 LAST 190    10,2776  54 412 1          TS    RADMODES
0653  REF   3 LAST 172    10,2777  0 4377 0          TC    SETTRKF       LAMP MIGHT GO OFF IF DATA JUST GOOD.
0654  REF   1             10,3000  0 3247 0          TC    RGOODEND -2

0655  REF   3 LAST 190    10,3001  54 424 1  NOEND   TS    NSAMP
0656  REF   7 LAST 190    10,3002  10 413 0  RESAMPLE CCS    SAMPLIM       SEE IF ANY MORE TRIES SHOULD BE MADE.
0657                       10,3003  1 3005 0          TCF   +2
0658  REF   1             10,3004  1 3146 0          TCF   DATAFAIL      N SAMPLES NOT AVAILABLE.
0659  REF  16 LAST 186    10,3005  3 7760 1          CAF   BIT4          RESET ACTIVITY BIT.
0660                       10,3006  0 0006 1          EXTEND
0661                       10,3007  05 013 0          WOR   13            RESET ACTIVITY BIT
0662  REF  11 LAST 189    10,3010  0 5733 0          TC    RESJME

0663  REF   8 LAST 177    10,3011  3 7757 0  LRHEIGHT CAF   BIT5
0664  REF  39 LAST 190    10,3012  54 061 1          TS    ITEMP1        (POSITION OF DATA GOOD BIT IN CHAN 33)

0665  REF   5 LAST 154    10,3013  3 7753 1          CAF   BIT9
0666  REF   1             10,3014  0 3037 0          TC    SCALECHK -1

0667  REF  14 LAST 186    10,3015  3 7751 0  RENDRAD  CAF   BIT11         MAKE SURE ANTENNA HAS NOT GONE OUT OF
0668  REF  58 LAST 190    10,3016  7 0412 1          MASK  RADMODES      LIMITS.
0669  REF 120 LAST 188    10,3017  10 000 0          CCS   A
0670  REF   2 LAST 189    10,3020  1 2726 1          TCF   BADRAD

0671  REF  59 LAST 190    10,3021  4 0412 1          CS    RADMODES      BE SURE RR CDU HASNT FAILED.
0672  REF  11 LAST 177    10,3022  7 7755 0          MASK  BIT7
0673  REF 121 LAST 190    10,3023  10 000 0          CCS   A
0674  REF   3 LAST 190    10,3024  1 2726 1          TCF   BADRAD
```

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0684	REF 17 LAST 190	10,3025	3 7760 1		CAF	BIT4	SEE IF DATA HAS BEEN GOOD.	
0685	REF 40 LAST 190	10,3026	54 061 1		TS	ITEMP1	(POSITION OF DATA GOOD BIT IN CHAN 33)	
0686	REF 17 LAST 190	10,3027	3 7763 1		CAF	BIT1	SEE IF RR RDOT.	
0687		10,3030	0 0006 1		EXTEND			
0688		10,3031	02 013 1		RAND	13		
0689	REF 50 LAST 188	10,3032	54 002 1		TS	Q	FOR LATER TESTING.	
0690	REF 122 LAST 190	10,3033	10 000 0		CCS	A		
0691		10,3034	1 3036 0		TCF	+2		
0692	REF 1	10,3035	1 3050 0		TCF	RADIN	NO SCALE CHECK FOR RR RDOT.	
0693	REF 4 LAST 189	10,3036	3 7761 0		CAF	BIT3		
0694	REF 40 LAST 190	10,3037	54 001 1		TS	L		
0695		10,3040	0 0006 1	SCALECHK	EXTEND			
0696		10,3041	02 033 0		RAND	33	SCALE STATUS NOW	
0697	REF 41 LAST 191	10,3042	56 001 0		XCH	L		
0698	REF 60 LAST 190	10,3043	7 0412 1		MASK	RADMODES	SCALE STATUS BEFORE	
0699		10,3044	0 0006 1		EXTEND			
0700		10,3045	06 001 0		RXOR	01	SEE IF THEY DIFFER	
0701	REF 123 LAST 191	10,3046	10 000 0		CCS	A		
0702	REF 1	10,3047	0 3067 0		TC	SCALCHNG	THEY DIFFER	
0703	REF 8 LAST 190	10,3050	3 7743 0	RADIN	CAF	POSMAX		
0704	REF 3 LAST 190	10,3051	7 0046 1		MASK	RNRAD		
0705	REF 13 LAST 164	10,3052	54 064 1		TS	ITEMP4		
0706	REF 4 LAST 191	10,3053	30 046 0		CAE	RNRAD		
0707		10,3054	6 0000 1		DOUBLE			
0708	REF 18 LAST 191	10,3055	7 7763 0		MASK	BIT1		
0709	REF 10 LAST 190	10,3056	54 063 0		TS	ITEMP3		
0710	REF 51 LAST 191	10,3057	10 002 1		CCS	Q	SEE IF RR RDOT.	
0711	REF 1	10,3060	1 3101 0		TCF	SCALADJ	NO, BUT SCALE CHANGING MAY BE NEEDED.	
0712		10,3061	0 0006 1		EXTEND		IF RR RANGE RATE, THROW OUT BIAS.	
0713	REF 1	10,3062	4 3161 0		DCS	RDOTBIAS		
0714	REF 11 LAST 191	10,3063	20 064 1	DASAMPL	DAS	ITEMP3		
0715	REF 41 LAST 191	10,3064	3 0061 0	DGCHECK2	CA	ITEMP1	SEE THAT DATA HAS BEEN GOOD BEFORE AND	
0716	REF 2 LAST 190	10,3065	0 3130 0		TC	DGCHECK +1	AFTER TAKING SAMPLE.	
0717	REF 1	10,3066	0 2772 1		TC	GOODRAD		
0718	REF 61 LAST 191	10,3067	22 412 0	SCALCHNG	LXCH	RADMODES		
0719	REF 19 LAST 191	10,3070	6 7763 1		AD	BIT1		
0720		10,3071	0 0006 1		EXTEND			
0721		10,3072	06 001 0		RXOR	01		
0722	REF 62 LAST 191	10,3073	54 412 1		TS	RADMODES		
0723	REF 2 LAST 188	10,3074	3 2707 0		CAF	DGBITS	UPDATE LAST VALUE OF DATA GOOD BITS.	
0724		10,3075	0 0006 1		EXTEND			
0725		10,3076	02 033 0		RAND	33		
0726	REF 2 LAST 188	10,3077	54 426 0		TS	OLDATAGD		

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0727 REF 4 LAST 190 10.3100 1 2726 1 TCF BADRAD

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P0728 THE FOLLOWING ROUTINE INCORPORATES RR RANGE AND LR ALT SCALE INFORMATION AND LEAVES DATA AT LO SCALE.

```
0730   REF  42 LAST 191   10,3101  10 001 1  SCALADJ  CCS    L          L HAS SCALE INBIT FOR THIS RADAR.
0731                      10,3102  1 3104 0           TCF    +2         ON HIGH SCALE.
0732   REF   1            10,3103  1 3064 1           TCF    DGCHECK2

0733   REF  12 LAST 191   10,3104  52 064 1           DXCH   ITEMP3
0734                      10,3105  20 001 1           DDOUBL
0735                      10,3106  20 001 1           DDOUBL
0736                      10,3107  20 001 1           DDOUBL
0737   REF  13 LAST 193   10,3110  52 064 1           DXCH   ITEMP3

0738   REF   5 LAST 191   10,3111  3 7761 0           CAF    BIT3       SEE IF LR OR RR.
0739                      10,3112  0 0006 1           EXTEND
0740                      10,3113  02 013 1           RAND   13
0741                      10,3114  0 0006 1           EXTEND             IF RR, NO MORE ACTION REQUIRED.
0742   REF   2 LAST 193   10,3115  1 3064 1           BZF    DGCHECK2

0743   REF   1            10,3116  3 3156 0           CAF    LRRATIO    IF LR, CONVERT TO LO SCALING.
0744                      10,3117  0 0006 1           EXTEND
0745   REF  14 LAST 191   10,3120  7 0064 1           MP     ITEMP4
0746   REF  15 LAST 193   10,3121  54 064 1           TS     ITEMP4
0747   REF  45 LAST 188   10,3122  3 7767 0           CAF    ZERO       (SO SUBSEQUENT DAS WILL BE OK)
0748   REF  14 LAST 193   10,3123  56 063 1           XCH    ITEMP3
0749                      10,3124  0 0006 1           EXTEND
0750   REF   2 LAST 193   10,3125  7 3156 1           MP     LRRATIO
0751   REF   1            10,3126  1 3063 0           TCF    DASAMPL
```

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```
0752  REF  42 LAST 191   10,3127  54 061 1  DSCHECK  TS      ITEMP1     UPDATE DATA GOOD BIT IN OLDDATAGD AND
0753                     10,3130  0 0006 1            EXTEND             MAKE SURE IT WAS ON BEFORE AND AFTER THE
0754                     10,3131  02 033 0            RAND    33         SAMPLE WAS TAKEN BEFORE RETURNING. IF
0755  REF  43 LAST 193   10,3132  54 001 1            TS      L          NOT, GOES TO RESAMPLE TO TRY AGAIN. IF
0756  REF  43 LAST 194   10,3133  4 0061 1            CS      ITEMP1     MAX NUMBER OF TRIES HAS BEEN REACHED,
0757  REF   3 LAST 191   10,3134  7 0426 0            MASK    OLDDATAGD  THE BIT CORRESPONDING TO THE DATA GOOD
0758  REF  44 LAST 194   10,3135  6 0001 0            AD      L          WHICH FAILED TO APPEAR IS IN ITEMP1 AND
0759  REF   4 LAST 194   10,3136  56 426 1            XCH     OLDDATAGD  CAN BE USED TO SET RADMODES WHICH VIA
0760  REF  44 LAST 194   10,3137  7 0061 1            MASK    ITEMP1     SETTRKF SETS THE TRACKER FAIL LAMP.
0761  REF  45 LAST 194   10,3140  6 0001 0            AD      L
0762  REF 124 LAST 191   10,3141  10 000 0            CCS     A          SHOULD BOTH BE ZERO.
0763  REF   1            10,3142  0 3002 0            TC      RESAMPLE
0764  REF  15 LAST 193   10,3143  52 064 1            DXCH    ITEMP3     IF DATA GOOD BEFORE AND AFTER, ADD TO
0765  REF   4 LAST 188   10,3144  20 415 0            DAS     SAMPI SUM  ACCUMULATION.
0766  REF  52 LAST 191   10,3145  0 0002 0            TC      Q

0767  REF  45 LAST 194   10,3146  4 0061 1  DATAFAIL CS      ITEMP1     IN THE ABOVE CASE, SET RADMODES BIT
0768  REF  53 LAST 191   10,3147  7 0412 1            MASK    RADMODES   SHOWING SOME RADAR DATA FAILED.
0769  REF  46 LAST 194   10,3150  6 0061 0            AD      ITEMP1
0770  REF  54 LAST 194   10,3151  54 412 1            TS      RADMODES

0771  REF  16 LAST 194   10,3152  52 064 1            DXCH    ITEMP3     IF WE HAVE BEEN UNABLE TO GATHER N
0772  REF   5 LAST 194   10,3153  52 415 0            DXCH    SAMPI SUM  SAMPLES, USE LAST ONE ONLY.

0773  REF   4 LAST 190   10,3154  0 4377 0            TC      SETTRKF

0774  REF   2 LAST 189   10,3155  1 2724 0            TCF     NOMORE

0775                     10,3156   23773 0  LRRATIO  2DEC    4.9977 B -3
0776                     10,3157   47777 0  LVELBIAS 2DEC    -12288     LANDING RADAR BIAS FOR 153.6 KC.
0777                     10,3160   00001 0  RDOTBIAS 2DEC    17000      BIAS COUNT FOR RR RANGE RATE
C0777                    10,3161   01150 1
```

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P0778 THIS ROUTINE CHANGES THE LR POSITION, AND CHECKS THAT IT GOT THERE.

```
0779                          10,3162  0 0004 0  LRPOS2   INHINT

0780  REF  16 LAST 189       10,3163  4 7756 0           CS      BIT6        DESIRED LR POSITION IS NOW 2.
0781  REF  55 LAST 194       10,3164  7 0412 1           MASK    RADMODES
0782  REF  17 LAST 195       10,3165  6 7756 1           AD      BIT6
0783  REF  56 LAST 195       10,3166  54 412 1           TS      RADMODES

0784  REF  12 LAST 190       10,3167  3 7755 1           CAF     BIT7
0785                          10,3170  0 0006 1           EXTEND
0786                          10,3171  02 033 0           RAND    33          SEE IF ALREADY THERE.
0787                          10,3172  0 0006 1           EXTEND
0788  REF   2 LAST 177       10,3173  1 3224 1           BZF     RADNOOP

0789  REF  13 LAST 177       10,3174  3 7747 1           CAF     BIT13
0790                          10,3175  0 0006 1           EXTEND
0791                          10,3176  05 012 1           WOR     12          COMMAND TO POSITION 2

0792  REF   1                 10,3177  3 3241 0           CAF     6SECS       START SCANNING FOR INBIT AFTER 7 SECS.
0793  REF  20 LAST 181        10,3200  0 5663 1           TC      WAITLIST
07935 REF  10 LAST 182                       E3          EBANK=  RRRET
0794                          10,3201   03237 1           2CADR   LRPOSCAN
C0794 REF   1                 10,3202   20063 0
0795  REF   4 LAST 188        10,3203  0 2303 0           TC      ROADBACK

0796  REF   8 LAST 190        10,3204  54 413 0  LRPOSNXT TS      SAMPLIM
07965 REF   8 LAST 182        10,3205  0 5701 1           TC      FIXDELAY    SCAN ONCE PER SECOND 15 TIMES MAX AFTER
0797                          10,3206   00144 0           DEC     100         INITIAL DELAY OF 7 SECONDS.

07975 REF  13 LAST 195        10,3207  3 7755 1           CAF     BIT7
0798                          10,3210  0 0006 1           EXTEND
07985                         10,3211  02 033 0           RAND    33
0799                          10,3212  0 0006 1           EXTEND
0800  REF   1                 10,3213  1 3231 0           BZF     LASTRDT     IF THERE, WAIT FINAL SECOND FOR BOUNCE.

08005 REF   9 LAST 195        10,3214  10 413 0           CCS     SAMPLIM     SEE IF MAX TIME UP.
0801  REF   1                 10,3215  1 3204 0           TCF     LRPOSNXT

0802  REF  14 LAST 195        10,3216  4 7747 0           CS      BIT13       IF TIME UP, DISABLE COMMAND AND ALARM.
08025                         10,3217  0 0006 1           EXTEND
0803                          10,3220  03 012 1           WAND    12

0804  REF  29 LAST 189        10,3221  0 4755 1           TC      ALARM       LR ANTENNA DIDNT MAKE IT.
0805                          10,3222   00523 0           OCT     523
0806  REF   4 LAST 189        10,3223  1 3256 1           TCF     RDBADEND

0807  REF  31 LAST 190        10,3224  3 7763 1  RADNOOP  CAF     ONE         NO FURTHER ACTION REQUESTED.
0808  REF  21 LAST 195        10,3225  0 5663 1           TC      WAITLIST
08085 REF  11 LAST 195                       E3          EBANK=  RRRET
```

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```
 0809                          10,3226   03251 1          2CADR   RGOODEND
C0809  REF   2 LAST 190        10,3227   20063 0
 0810  REF   5 LAST 195        10,3230   0 2303 0         TC      ROADBACK

 0811  REF   9 LAST 195        10,3231   0 5701 1 LASTLRDT TC      FIXDELAY    WAIT ONE SECOND AFTER RECEIPT OF INBIT
 08111                         10,3232    00144 0         DEC     100         TO WAIT FOR ANTENNA BOUNCE TO DIE OUT.

 08112 REF  15 LAST 195        10,3233   4 7747 0         CS      BIT13       REMOVE COMMAND
 08113                         10,3234   0 0006 1         EXTEND
 08114                         10,3235   03 012 1         WAND    12
 08115 REF   3 LAST 196        10,3236   1 3251 0         TCF     RGOODEND

 08116 REF   9 LAST 190        10,3237   3 7757 0 LRPOSCAN CAF     BIT5        SET UP FOR 15 SAMPLES.
 08117 REF   2 LAST 195        10,3240   1 3204 0         TCF     LRPOSNXT

 08118                         10,3241    01130 1 65ECS   DEC     600
```

L0001 RADAR LEAD-IN ROUTINES USER'S OWN PAGE NO. 30 53 E3

P0812 SEQUENCES TO TERMINATE RR OPERATIONS.

```
0813   REF  14 LAST 195     10,3242  3 7755 1  ENDRADAR CAF    BIT7        PROLOG TO CHECK RR CDU FAIL BEFORE END.
0814   REF  67 LAST 195     10,3243  7 0412 1            MASK   RADMODES
0815   REF 125 LAST 194     10,3244  10 000 0            CCS    A
0816   REF   4 LAST 196     10,3245  1 3251 0            TCF    RGOODEND
0817   REF   5 LAST 195     10,3246  1 3256 1            TCF    RDBADEND
0818   REF  46 LAST 193     10,3247  4 7767 1  -2        CS     ZERO        RGOODEND WHEN NOT UNDER WAITLIST CONTROL
0819   REF   2 LAST  26     10,3250  55'076 0            TS     RUPTAGN

0820   REF  13 LAST 179     10,3251  3 7762 0  RGOODEND CAF    TWO
0821   REF   7 LAST 164     10,3252  0 5225 1            TC     POSTJUMP
0822   REF   4 LAST 162     10,3253   26720 0            CADR   GOODEND

0823   REF  47 LAST 197     10,3254  4 7767 1  -2        CS     ZERO        RDBADEND WHEN NOT UNDER WAITLIST.
0824   REF   3 LAST 197     10,3255  55'076 0            TS     RUPTAGN
0825   REF  14 LAST 197     10,3256  3 7762 0  RDBADEND CAF    TWO
0826   REF   8 LAST 197     10,3257  0 5225 1            TC     POSTJUMP
0827   REF   2 LAST 155     10,3260   26715 0            CADR   BADEND

0828   REF   5 LAST 167                6311  BIN3      EQUALS THREE
```

L RADAR TEST PROGRAMS USER'S OWN PAGE NO. 1 S3

```
 0001                                  10,3261          BANK    10
 0002   REF   1                          E7             EBANK=  RSTLOC

R0003          RADAR SAMPLING LOOP.

 0004   REF   1                 10,3261  11'445 1  RADSAMP CCS     RSAMBDT        TIMES NORMAL ONCE-PER-SECOND SAMPLING.
 0005                           10,3262  1 3264 0          TCF     +2

 0006   REF  15 LAST 173        10,3263  1 5727 1          TCF     TASKOVER       +0 INSERTED MANUALLY TERMINATES TEST.

 0007   REF  22 LAST 195        10,3264  0 5663 1          TC      WAITLIST
 00075  REF   2 LAST 198                    E7             EBANK=  RSTLOC
 0008                           10,3265   03261 1          2CADR   RADSAMP
C0008   REF   1                 10,3266   20067 1
 0009   REF   1                 10,3267  3 5647 1          CAF     PRIO25
 0010   REF   5 LAST 166        10,3270  0 5505 1          TC      NOVAC
 00105  REF   3 LAST 198                    E7             EBANK=  RSTLOC
 0011                           10,3271   03301 0          2CADR   DORSAMP
C0011   REF   1                 10,3272   20067 1
 0012   REF   1                 10,3273  3 3332 0          CAF     1/6            FOR CYCLIC SAMPLING, RTSTDEX =
 0013                           10,3274  0 0006 1          EXTEND                 RTSTLOC/6 + RTSTBASE.
 0014   REF   2 LAST  47        10,3275  7 1444 0          MP      RTSTLOC
 0015   REF   1                 10,3276  6 1443 0          AD      RTSTBASE       0 FOR RR, 2 FOR LR.
 0016   REF   1                 10,3277  55'441 0          TS      RTSTDEX

 0017   REF  16 LAST 198        10,3300  1 5727 1          TCF     TASKOVER

R0018          DO THE ACTUAL RADAR SAMPLE.

 0019   REF   1                 10,3301  0 3333 1  DORSAMP TC      VARADAR        SELECTS VARIABLE RADAR CHANNEL.
 0020   REF   3 LAST  90        10,3302  0 5206 0          TC      BANKCALL
 0021   REF   1                 10,3303   26745 0          CADR    RADSTALL
 0022   REF   1                 10,3304  25'446 0          INCR    RFAILCNT       ADVANCE FAIL COUNTER BUT ACCEPT BAD DATA

 0023                           10,3305  0 0004 0  DORSAMP2 INHINT                 YES - UPDATE TM BUFFER.
 0024   REF   6 LAST 194        10,3306  52 415 0          DXCH    SAMPLSUM
 0025   REF   4 LAST 198        10,3307  51'444 1          INDEX   RSTLOC
 0026   REF   1                 10,3310  53'450 0          DXCH    RSTACK

 0027   REF   2 LAST 189        10,3311  52 417 1          DXCH    OPTYHOLD
 0028   REF   5 LAST 198        10,3312  51'444 1          INDEX   RSTLOC
 0029   REF   2 LAST 198        10,3313  53'452 1          DXCH    RSTACK +2

 0030   REF   4 LAST 188        10,3314  52 421 1          DXCH    TIMEHOLD
 0031   REF   6 LAST 198        10,3315  51'444 1          INDEX   RSTLOC
 0032   REF   3 LAST 198        10,3316  53'454 1          DXCH    RSTACK +4

 0033   REF   3 LAST 198        10,3317  4 1444 0          CS      RTSTLOC        CYCLE RTSTLOC.
 0034   REF   1                 10,3320  6 1442 1          AD      RTSTMAX
 0035                           10,3321  0 0006 1          EXTEND
```

L RADAR TEST PROGRAMS USER'S OWN PAGE NO. 2 S3 E7

```
0036                        10,3322  1 3325 1            BZF     +3
0037  REF   7 LAST 198      10,3323  3 1444 1            CA      RSTCLOC
0038  REF   3 LAST 141      10,3324  6 6306 1            AD      SIX
0039  REF   8 LAST 199      10,3325  55'444 0            TS      RSTCLOC

0040  REF   2 LAST 198      10,3326  11'445 1            CCS     RSAMPDT     SEE IF TIME TO RE-SAMPLE.
0041  REF   9 LAST 186      10,3327  1 5567 1            TCF     ENDOFJOB    NO - WAIT FOR T3 (REGULAR SAMPLING).

0042  REF  10 LAST 199      10,3330  1 5567 1            TCF     ENDOFJOB    TEST TERMINATED.
0043  REF   2 LAST 198      10,3331  1 3301 1            TCF     DORSAMP     JUMP RIGHT BACK AND GET ANOTHER SAMPLE.

0044                        10,3332   05341 1  1/6       DEC     .17

R0045          VARIABLE RADAR DATA CALLER FOR ONE MEASUREMENT ONLY.

0046  REF  32 LAST 195      10,3333  3 7763 1  VARADAR   CAF     ONE         WILL BE SENT TO RADAR ROUTINE IN A BY
0047  REF   4 LAST 157      10,3334  54 123 0            TS      BUF2        SWCALL.
0048  REF   2 LAST 198      10,3335  51'441 1            INDEX   RTSTNEX
0049  REF   1               10,3336  3 3340 0            CAF     RDRLOCS
0050  REF   2 LAST  94      10,3337  1 5212 1            TCF     SWCALL      NOT TOUCHING Q.

0051  REF   1               10,3340   20651 1  RDRLOCS   CADR    RRRANGE     =0
0052  REF   1               10,3341   20647 0            CADR    RRRDOT      =1
0053  REF   1               10,3342   20645 1            CADR    LRVELX      =2
0054  REF   1               10,3343   20643 1            CADR    LRVELY      =3
0055  REF   1               10,3344   20641 0            CADR    LRVELZ      =4
0056  REF   1               10,3345   20637 1            CADR    LRALT       =5
```

L EXTENDED VERBS USER'S OWN PAGE NO. 1 53

```
0001                                11,2000          BANK   11
0002  REF   1                        E5              EBANK= OGC

R0003  FAN-OUT

R0004  NOTE OF SPECIAL IMPORT CONCERNING RADAR %%

R0005            SINCE 206 HAS NO RADARS, THE INTERRUPT LEAD IN AND T4RUPT SERVICE ROUTINES HAVE BEEN DISCONNECTED IN
R0007  SUNBURST (REV 39).  THEREFORE, THE FOLLOWING VERBS SHOULD NOT BE USED:  40 WITH NOUN 40, 41 WITH NOUN 40, 45,
R0009  46, AND SEQUENCES 13 AND 14 OF VERB 57.

0010  REF   1                 11,2000  0 2070 1  LST2FAN  TC     VBZERO          VB40 ZERO (USED WITH NOUN 20 OR 40 ONLY)
0011  REF   1                 11,2001  0 2073 1           TC     VBCOARK         VB41 COARSE ALIGN (USED WITH NOUN 20 OR
A0012                                                                             40 ONLY)
0013  REF   1                 11,2002  0 2204 0           TC     IMUFINEK        VB42 FINE ALIGN IMU
0014  REF   1                 11,2003  0 2565 0           TC     IMUATTCK        VB43  LOAD IMU ATTITUDE ERROR METERS.
0015  REF   1                 11,2004  0 2066 0           TC     ALM/END         VB44 SPARE
0016  REF   1                 11,2005  1 2126 1           TCF    LRPOS2K         VB45 COMMAND LR TO POSITION 2.
0017  REF   1                 11,2006  0 2414 1           TC     REGRSAMP        VB46 SAMPLE RADAR ONCE PER SECOND
0018  REF   1                 11,2007  0 2406 1           TC     DOFCSTST        VB47 PERFORM LEM FCS TEST
0019  REF   1                 11,2010  0 2261 0           TC     GOLOADLV        VB50 PLEASE PERFORM
0020  REF   2 LAST 200        11,2011  0 2261 0           TC     GOLOADLV        VB51 PLEASE MARK
0021  REF   3 LAST 200        11,2012  0 2261 0           TC     GOLOADLV        VB52 PLEASE MARK Y
0022  REF   4 LAST 200        11,2013  0 2261 0           TC     GOLOADLV        VB53 PLEASE MARK X OR Y.
0023  REF   1                 11,2014  0 2265 1           TC     TORQGYRS        VB54 PULSE TORQUE GYROS
0024  REF   1                 11,2015  0 2302 1           TC     ALINTIME        VB55 ALIGN TIME
0025  REF   1                 11,2016  0 2404 0           TC     GOSHOSUM        VB56 PERFORM BANKSUM
0026  REF   1                 11,2017  0 2326 1           TC     SYSTEST         VB57 PERFORM SYSTEM TEST
0027  REF   1                 11,2020  0 3121 0           TC     PRESTAND        VB60 PREPARE FOR STANDBY
0028  REF   1                 11,2021  0 3167 1           TC     POSTAND         VB61 RECOVER FROM STANDBY
0029  REF   1                 11,2022  0 2634 1           TC     SETJPMSG        VB62 SCAN LEM INBITS
0030  REF   1                 11,2023  1 2530 1           TCF    BEGINCDU        VB63 SEND SPECIAL CDU DOWNLIST
0031  REF   1                 11,2024  1 3266 1           TCF    64JPDAT         VB64 SET TIMER TO GROUND ELAPSED TIME
0032  REF   1                 11,2025  1 3242 1           TCF    65JPDAT         VB65 SET GUIDANCE REFERENCE RELEASE DISC
0033  REF   1                 11,2026  1 3246 0           TCF    66JPDAT         VB66 INITIATE LGC DFI TLM CALIBRATE RTN
0034  REF   1                 11,2027  1 3254 0           TCF    67JPDAT         VB67 SEND COMMAND TO LMP
0035  REF   1                 11,2030  1 3260 1           TCF    70JPDAT         VB70 SET MISSION TIMER
0036  REF   1                 11,2031  1 3262 0           TCF    71JPDAT         VB71 SET MISSION PHASE REGISTER
0037  REF   1                 11,2032  1 3270 0           TCF    72JPDAT         VB72 SET MISSION PHASE REGISTER + TIMER
0038  REF   1                 11,2033  1 3252 0           TCF    73JPDAT         VB73 RESET DPS OR RPS COLD SOAK DISC
0039  REF   1                 11,2034  1 3244 1           TCF    74JPDAT         VB74 STOP MISSION TIMERS
0040  REF   1                 11,2035  1 3301 1           TCF    75JPDAT         VB75 TARGET PARAMETER UPDATE
0041  REF   1                 11,2036  1 3274 1           TCF    76JPDAT         VB76 STATE VECTOR UPDATE
0042  REF   2 LAST 200        11,2037  0 2066 0           TC     ALM/END

0043  REF   6 LAST 193        11,2040  3 7761 0  TESTXACT  CAF    BIT3
0044  REF   2 LAST  98        11,2041  7 0336 0           MASK   EXTVBACT
0045  REF 126 LAST 197        11,2042  10 000 0           CCS    A
0046  REF   1                 11,2043  0 2053 0           TC     XACTALM
```

L EXTENDED VERBS USER'S OWN PAGE NO. 2 S3 E5

```
0047  REF   7 LAST 200     11,2044  4 7761 1  XACT1    CS      BIT3
0048                       11,2045  0 0004 0           INHINT
0049  REF   3 LAST 200     11,2046  7 0336 0           MASK    EXTVBACT
0050  REF   8 LAST 201     11,2047  6 7761 0           AD      BIT3
0051  REF   4 LAST 201     11,2050  54 336 0           TS      EXTVBACT
0052                       11,2051  0 0003 1           RELINT
0053  REF  53 LAST 194     11,2052  0 0002 0           TC      Q

0054  REF   1              11,2053  0 4571 0  XACTALM  TC      FALTON
0055  REF  11 LAST 199     11,2054  0 5567 0           TC      ENDOFJOB

0056  REF   1              11,2055  0 4724 1  TERMEXTV TC      FREEDSP        IF WE GET A TERMINATE INSTEAD OF A LOAD.

0057  REF   1              11,2056  0 2060 0  ENDEXTVB TC      XACT0
0058  REF  12 LAST 201     11,2057  0 5567 0           TC      ENDOFJOB

0059  REF   9 LAST 201     11,2060  4 7761 1  XACT0    CS      BIT3
0060                       11,2061  0 0004 0           INHINT
0061  REF   5 LAST 201     11,2062  7 0336 0           MASK    EXTVBACT
0062  REF   6 LAST 201     11,2063  54 336 0           TS      EXTVBACT
0063                       11,2064  0 0003 1           RELINT
0064  REF  54 LAST 201     11,2065  0 0002 0  XACTOQ   TC      Q


0065  REF   2 LAST 201     11,2066  0 4571 0  ALM/END  TC      FALTON
0066  REF   1              11,2067  0 2056 0           TC      ENDEXTVB


0067  REF   1              11,2070  0 2076 1  V3ZERO   TC      OP/INERT
0068  REF   1              11,2071  0 2110 0           TC      IMUZEROK       RETURN HERE IF NOUN = ICDU(20)
0069  REF   1              11,2072  0 2117 1           TC      RRZEROK        RETURN HERE IF NOUN = RCDU(40)

0070  REF   2 LAST 201     11,2073  0 2076 1  V3COARK  TC      OP/INERT
0071  REF   1              11,2074  0 2132 0           TC      IMUCOARK       RETURN HERE IF NOUN = ICDU(20)
0072  REF   1              11,2075  0 2234 0           TC      RRDESNBK       RETURN HERE IF NOUN = RCDU(40)

R0073          RETURNS TO L+1 IF IMU OR L+2 IF RR.

0074  REF  10 LAST 196     11,2076  4 7757 1  OP/INERT CS      BIT5           OCT20
0075  REF   2 LAST  98     11,2077  6 0273 1           AD      NOUNREG
0076                       11,2100  0 0006 1           EXTEND
0077  REF   1              11,2101  1 2065 1           BZF     XACTOQ         IF = 20.

0078  REF  55 LAST 201     11,2102  24 002 0           INCR    Q
0079  REF   1              11,2103  6 2107 0           AD      RRIMUDIF       = -20 OCT.
0080                       11,2104  0 0006 1           EXTEND
0081  REF   2 LAST 201     11,2105  1 2065 1           BZF     XACTOQ
```

```
L       EXTENDED VERBS                                          USER'S OWN PAGE NO.  3          53  E5
0082  REF  3 LAST 200     11,2106  0 2066 0          TC    ALM/END     ILLEGAL.
0083                      11,2107   77757 1  RRIMUDIF DCT    -20
```

L EXTENDED VERBS USER'S OWN PAGE NO. 4 S3 E5

P0084 KEYBOARD REQUEST TO ZERO IMU ENCODERS

```
0085  REF   1                11,2110  0 2040 1  IMUZERO<  TC      TESTxACT        ZERO ENCODERS.
0086  REF   4 LAST 198        11,2111  0 5206 0            TC      BANKCALL
0087  REF   1                11,2112   26000 0            CADR    IMUZERO

0088  REF   5 LAST 203        11,2113  0 5206 0            TC      BANKCALL        STALL
0089  REF   1                11,2114   26751 0            CADR    IMUSTALL
0090                         11,2115  0 2116 0            TC      +1

0091  REF   2 LAST 201        11,2116  0 2056 0            TC      ENDEXTVB
0092  REF   2 LAST 203        11,2117  0 2040 1  RRZERO<  TC      TESTxACT
0093  REF   6 LAST 203        11,2120  0 5206 0            TC      BANKCALL        ZERO RR CDUS.
0094  REF   1                11,2121   20250 1            CADR    RRZERO

0095  REF   7 LAST 203        11,2122  0 5206 0  RWAITK    TC      BANKCALL
0096  REF   2 LAST 198        11,2123   26745 0            CADR    RADSTALL
0097                         11,2124  1 2125 1            TCF     +1
0098  REF   3 LAST 203        11,2125  1 2056 1            TCF     ENDEXTVB

0099  REF   3 LAST 203        11,2126  0 2040 1  LRPOS2<  TC      TESTxACT        COMMAND LR TO POSITION 2.
0100  REF   8 LAST 203        11,2127  0 5206 0            TC      BANKCALL
0101  REF   1                11,2130   21162 1            CADR    LRPOS2
0102  REF   1                11,2131  1 2122 0            TCF     RWAITK
```

L EXTENDED VERBS USER'S OWN PAGE NO. 5 S3 E5

P0103 KEYBOARD REQUEST TO COARSE ALIGN THE IMU

```
0104  REF   4 LAST 203    11,2132  0 2040 1  IMUCOARK  TC     TESTXACT     COARSE ALIGN FROM KEYBOARD.
0105  REF   1             11,2133  0 4644 0            TC     GRABWAIT
0106  REF   1             11,2134  3 2152 0            CAF    VNLODCDU     CALL FOR THETAD LOAD
0107  REF   4 LAST 161    11,2135  0 4657 1            TC     NVSBWAIT
0108  REF   4 LAST 161    11,2136  0 4475 0            TC     ENDIDLE      STALL WAITING FOR THE LOAD
0109  REF   1             11,2137  0 2055 0            TC     TERMEXTV
0110  REF   1             11,2140  0 2154 0            TC     ICSDEL       PROCEED = ASK FOR INCREMENTAL LOAD.

0111  REF   1             11,2141  3 2153 1  ICORK2    CAF    IMJCOARV     RE-DISPLAY COARSE ALIGN VERB.
0112  REF   5 LAST 204    11,2142  0 4657 1            TC     NVSBWAIT
0113  REF   2 LAST 201    11,2143  0 4724 1            TC     FREEDSP      RELEASE THE DISPLAYS

0114  REF   9 LAST 203    11,2144  0 5206 0            TC     BANKCALL     CALL MODE SWITCHING PROG
0115  REF   1             11,2145  26065 0            CADR   IMJCOARS

0116  REF  10 LAST 204    11,2146  0 5206 0            TC     BANKCALL     STALL
0117  REF   2 LAST 203    11,2147  26751 0            CADR   IMJSTALL
0118  REF   4 LAST 203    11,2150  0 2056 0            TC     ENDEXTVB
0119  REF   5 LAST 204    11,2151  0 2056 0            TC     ENDEXTVB

0120                      11,2152  02522 0  VNLODCDJ  OCT    02522
0121                      11,2153  04100 1  IMUCOARV  OCT    04100
```

L EXTENDED VERBS USER'S OWN PAGE NO. 6 53 E5

P0122 PROVISION FOR COARSE ALIGN TO INCREMENTAL ANGLES.

```
0123  REF   1                 11,2154  3 2202 0  ICSDEL   CAF     DELLOAD
0124  REF   6 LAST 204        11,2155  0 4657 1           TC      NVSBWAIT     REQUEST LOAD OF DELTA ICDU ANGLES.
0125  REF   5 LAST 204        11,2156  0 4475 0           TC      ENDIDLE
0126  REF   2 LAST 204        11,2157  0 2055 0           TC      TERMEXTV
0127  REF   1                 11,2160  0 2141 1           TC      ICORK2       PROCEED WITHOUT DATA HERE TOO.
0128  REF   1                 11,2161  0 2163 1           TC      INCLOOP      LOOP TO INCREMENT THETAD FROM DSPTEM2.
0129  REF   2 LAST 205        11,2162  0 2141 1           TC      ICORK2       RE-DISPLAY COARSE ALIGN VERB.

0130  REF  56 LAST 201        11,2163  56 002 0  INCLOOP  XCH     Q            INCREMENTS THETADS IN 2S COMPLEMENT FROM
0131  REF  51 LAST 186        11,2164  54 144 1           TS      MPAC          THREE ANGLE INCREMENTS IN DSPTEM2S.
0132  REF   1                 11,2165  3 2203 1           CAF     LTHD+2
0133  REF   8 LAST  91        11,2166  54 120 0           TS      BUF          SET UP FOR CDUINC.
0134  REF  15 LAST 197        11,2167  3 7762 0           CAF     TWO          THREE TIMES THROUGH.

0135  REF  52 LAST 205        11,2170  54 145 0  INCLOOP2 TS      MPAC +1
0136  REF 127 LAST 200        11,2171  50 000 1           INDEX   A
0137  REF   3 LAST 161        11,2172  56 342 1           XCH     DSPTEM2      INCREMENT TO TEM2 FOR CDUINC.
0138  REF  11 LAST 204        11,2173  0 5206 0           TC      BANKCALL
0139  REF   1                 11,2174   33602 0          CADR    CDUINC
0140  REF   9 LAST 205        11,2175  10 120 0           CCS     BUF
0141  REF  10 LAST 205        11,2176  54 120 0           TS      BUF
0142  REF  53 LAST 205        11,2177  10 145 0           CCS     MPAC +1
0143  REF   1                 11,2200  0 2170 0           TC      INCLOOP2

0144  REF  54 LAST 205        11,2201  0 0144 0           TC      MPAC         RETURN WHEN FINISHED.

0145                          11,2202   02523 1  DELLOAD  OCT     02523
0146  REF   3 LAST 143        11,2203   00402 1  LTHD+2   ADRES   THETAD +2
```

L EXTENDED VERBS USER'S OWN PAGE NO. 7 S3 E5

P0147 KEYBOARD REQUEST TO FINE ALIGN AND GYRO TORQUE IMU

```
0148  REF   5 LAST 204   11,2204  0 2040 1  IMUFINEK  TC    TESTXACT    FINE ALIGN WITH GYRO TORQUING.
0149  REF   2 LAST 204   11,2205  0 4644 0            TC    GRABWAIT
0150  REF   1            11,2206  3 2232 0            CAF   VNLODGYR    CALL FOR LOAD OF GYRO COMMANDS
0151  REF   7 LAST 205   11,2207  0 4657 1            TC    NVSBWAIT
0152  REF   6 LAST 205   11,2210  0 4475 0            TC    ENDIDLE     HOLD UP FOR THE DATA LOAD
0153  REF   3 LAST 205   11,2211  0 2055 0            TC    TERMEXTV
0154                     11,2212  0 2213 0            TC    +1          PROCEED WITHOUT A LOAD

0155  REF   1            11,2213  3 2233 1            CAF   IMUFINEV    RE-DISPLAY OUR OWN VERB
0156  REF   8 LAST 206   11,2214  0 4657 1            TC    NVSBWAIT
0157  REF   3 LAST 204   11,2215  0 4724 1            TC    FREEDSP     RELEASE DISPLAYS

0158  REF  12 LAST 205   11,2216  0 5206 0            TC    BANKCALL    CALL MODE SWITCH PROG
0159  REF   1            11,2217  26252 0            CADR  IMUFINE

0160  REF  13 LAST 206   11,2220  0 5206 0            TC    BANKCALL    HIBERNATION
0161  REF   3 LAST 204   11,2221  26751 0            CADR  IMUSTALL
0162  REF   6 LAST 204   11,2222  0 2056 0            TC    ENDEXTVB

0163  REF   1            11,2223  3 2300 0  FINEK2    CAF   LGYROBIN    PINBALL LEFT COMMANDS IN OGC REGISTERS
0164  REF  14 LAST 206   11,2224  0 5206 0            TC    BANKCALL
0165  REF   1            11,2225  26362 1            CADR  IMUPULSE

0166  REF  15 LAST 206   11,2226  0 5206 0            TC    BANKCALL    WAIT FOR PULSES TO GET OUT.
0167  REF   4 LAST 206   11,2227  26751 0            CADR  IMUSTALL
0168  REF   7 LAST 206   11,2230  0 2056 0            TC    ENDEXTVB
0169  REF   8 LAST 206   11,2231  0 2056 0            TC    ENDEXTVB

0170                     11,2232  02567 1  VNLODGYR  OCT   02567
0171                     11,2233  04200 1  IMUFINEV  OCT   04200       FINE ALIGN VERB
```

L EXTENDED VERBS USER'S OWN PAGE NO. 8 S3 E5

```
P0172           DESIGNATE TO DESIRED GIMBAL ANGLES.

 0173   REF   6 LAST 206    11,2234  0 2040 1  RRDESNBK  TC     TESTXACT
 0174   REF   3 LAST 206    11,2235  0 4644 0            TC     GRABWAIT
 0175   REF   1             11,2236  3 2255 1            CAF    VNLORCDU      ASK FOR GIMBAL ANGLES.
 0176   REF   9 LAST 206    11,2237  0 4657 1            TC     NVSBWAIT
 0177   REF   7 LAST 206    11,2240  0 4475 0            TC     ENDIDLE       WAIT FOR THE LOAD
 0178   REF   4 LAST 206    11,2241  0 2055 0            TC     TERMEXTV
 0179                       11,2242  0 2243 0            TC     +1            PROCEED

 0180   REF  16 LAST 206    11,2243  0 5206 0            TC     BANKCALL      ASK OP FOR LOCK ON REQUIREMENTS.
 0181   REF   1             11,2244    22760 0           CADR   AURLOKON

 0182   REF   1             11,2245  3 2153 1            CAF    OPTCOARV      RE-DISPLAY OUR OWN VERB
 0183   REF  10 LAST 207    11,2246  0 4657 1            TC     NVSBWAIT
 0184                       11,2247  0 0004 0            INHINT                FIRE UP JOB TO DO DESIGNATE.
 0185   REF   1             11,2250  3 7746 0            CAF    PRIO20
 0186   REF   5 LAST 182    11,2251  0 5516 0            TC     FINDVAC
 0187   REF   2 LAST 200                 E5              EBANK= OGC
 0188                       11,2252    02256 1           2CADR  RRDESK2
C0188   REF   1             11,2253    22065 1
 0189   REF   5 LAST 207    11,2254  1 2055 1            TCF    TERMEXTV      FREES DISPLAY.

 0190                       11,2255    02441 1  VNLORCDU DCT    2441
 0191   REF   2 LAST 204                11,2153  OPTCOARV EQUALS IMUCOARV      DIFFERENT NOUNS.

 0192   REF  17 LAST 207    11,2256  0 5206 0  RRDESK2   TC     BANKCALL
 0193   REF   1             11,2257    20364 1           CADR   RRDESNB

 0194   REF   2 LAST 203    11,2260  0 2122 1            TC     RWAITK

R0195   PLEASE PERFORM VERB AND PLEASE MARK VERB ----- PRESSING ENTER INDICATES
R0196   ACTION REQUESTED HAS BEEN PERFORMED, AND DOES SAME RECALL AS A COMPLETED
R0197   LOAD.  OPERATOR SHOULD DO VB PROCEED WITHOUT DATA IF HE WISHES NOT TO
R0198   PERFORM THE REQUESTED ACTION.

 0199   REF   1             11,2261  0 4626 1  GOLOADLV  TC     FLASHOFF
 0200   REF   2 LAST 201    11,2262  0 2060 0            TC     XACTO
 0201   REF   9 LAST 197    11,2263  0 5225 1            TC     POSTJUMP
 0202   REF   1             11,2264    12002 0           CADR   LOADLV1
```

L EXTENDED VERBS USER'S OWN PAGE NO. 9 S3 E5

P0203 KEYBOARD REQUEST TO PULSE TORQUE IRIGA

```
0204  REF   7 LAST 207    11,2265  0 2040 1  TORQGYRS  TC      TESTXACT      GYRO TORQUING WITH NO MODE-SWITCH.
0205  REF   4 LAST 207    11,2266  0 4644 0            TC      GRABWAIT
0206  REF   2 LAST 206    11,2267  3 2232 0            CAF     VNLOADGYR
0207  REF  11 LAST 207    11,2270  0 4657 1            TC      NVSBWAIT
0208  REF   8 LAST 207    11,2271  0 4475 0            TC      ENDIDLE
0209  REF   6 LAST 207    11,2272  0 2055 0            TC      TERMEXTV
0210                       11,2273  0 2274 1            TC      +1
0211  REF   1              11,2274  3 2301 1            CAF     TORQGYRV      RE-DISPLAY OUR OWN VERB
0212  REF  12 LAST 208     11,2275  0 4657 1            TC      NVSBWAIT
0213  REF   4 LAST 206     11,2276  0 4724 1            TC      FREEDSP
0214  REF   1              11,2277  1 2223 1            TCF     FINEK2

0215  REF   4 LAST  46     11,2300    00403  0  LGYROBIN  ECADR   DELVX
0216                       11,2301    05400  0  TORQGYRV  DCT     05400
```

L EXTENDED VERBS USER'S OWN PAGE NO. 10 S3 E5

```
P0217   ALIGN TIME
 0218   REF   1                 11,2302  3 2325 1  ALINTIME CAF    VNLODDT     USES NVSUBMON. DOES NOT TEST DSPLOCK.
 0219   REF   2 LAST 166        11,2303  54 113 0            TS     NVTEMP      DOES NOT KILL MONITOR.
 0220   REF   1                 11,2304  0 4460 1            TC     NVSUBMON
 0221   REF  13 LAST 201        11,2305  0 5567 0            TC     ENDOFJOB    IN CASE OF ALARM IN LOAD REQUEST SET UP.
 0222   REF   9 LAST 208        11,2306  0 4475 0            TC     ENDIDLE
 0223   REF  14 LAST 209        11,2307  0 5567 0            TC     ENDOFJOB    TERMINATE
 0224   REF  15 LAST 209        11,2310  0 5567 0            TC     ENDOFJOB    PROCEED WITHOUT DATA
 0225                           11,2311  0 0004 0            INHINT             DELTA TIME IS IN DSPTEM1, +1.
 0226   REF  48 LAST 197        11,2312  3 7767 0            CAF    ZERO
 0227   REF  55 LAST 205        11,2313  54 146 0            TS     MPAC +2     NEEDED FOR TP AGREE
 0228   REF  46 LAST 194        11,2314  54 001 1            TS     L           ZERO T1 & T2 WHILE ALIGNING.
 0229   REF   5 LAST 188        11,2315  52 025 1            DXCH   TIME2
 0230   REF  56 LAST 209        11,2316  52 145 0            DXCH   MPAC
 0231   REF   1                 11,2317  52 340 1            DXCH   DSPTEM1     INCREMENT.
 0232   REF  57 LAST 209        11,2320  20 145 0            DAS    MPAC

 0233   REF   2 LAST 148        11,2321  0 7327 0            TC     TPAGREE     FORCE SIGN AGREEMENT.
 0234   REF  58 LAST 209        11,2322  52 145 0            DXCH   MPAC        NEW CLOCK.
 0235   REF   6 LAST 209        11,2323  20 025 1            DAS    TIME2
 0236   REF  16 LAST 209        11,2324  0 5567 0            TC     ENDOFJOB

 0237                           11,2325   02124 1  VNLODDT  DCT    02124       V/N FOR LOAD DELTA TIME
```

L EXTENDED VERBS USER'S OWN PAGE NO. 11 53 E5

```
P0238          SELECT AND INITIATE DESIRED SYSTEM TEST PROGRAM.

 0239   REF   1                          E5          EBANK=  QPLACE

 0240   REF   7 LAST  94     11,2326  10 302 1  SYSTEST  CCS   MODREG      DEMAND MODE 00.
 0241   REF   2 LAST 200     11,2327   1 2053 1           TCF   XACTALM

 0242   REF   5 LAST 208     11,2330   0 4644 0           TC    GRABWAIT
 0243   REF   1              11,2331   3 2403 1  REDO     CAF   LOPL       ASK FOR TEST OPTION (1 - 7).
 0244   REF  59 LAST 209     11,2332  54 146 0           TS    MPAC +2
 0245   REF   1              11,2333   3 2402 0           CAF   TESTNV
 0246   REF  13 LAST 208     11,2334   0 4657 1           TC    NVSBWAIT
 0247   REF  10 LAST 209     11,2335   0 4475 0           TC    ENDIDLE
 0248   REF   1              11,2336   0 5566 1           TC    EJFREE
 0249   REF   1              11,2337   0 2331 1           TC    REDO

 0250   REF.  1              11,2340   0 4117 1           TC    NEWMODEX
 0251                        11,2341    00005 1           OCT   5          DISPLAY MAJOR MODE 5 - SYSTEM TESTS

 0252                        11,2342   0 0004 0           INHINT
 0253   REF   2 LAST 207     11,2343   3 7746 0           CAF   PRIO30
 0254   REF   6 LAST 207     11,2344   0 5516 0           TC    FINDVAC
 0255   REF   3 LAST 207                E5          EBANK=  OGC
 0256                        11,2345    02350 0          2CADR TSELECT
C0256   REF   1              11,2346    22065 1
 0257   REF  17 LAST 209     11,2347   0 5567 0           TC    ENDOFJOB   LEAVING DISPLAY GRABBED FOR SYSTEM TEST.

 0258   REF   1              11,2350   4 5343 1  TSELECT  CS    LOW4       OCTAL 17 OPTIONS WITHOUT OPERATOR ERRO
 0259   REF   2 LAST 210     11,2351   6 1546 1           AD    QPLACE
 0260                        11,2352   0 0006 1           EXTEND
 0261                        11,2353   6 2356 0           BZMF  +3
 0262   REF   3 LAST 201     11,2354   0 4571 0           TC    FALTON
 0263   REF   2 LAST 210     11,2355   0 2331 1           TC    REDO
 0264   REF   3 LAST 210     11,2356   51546 1            INDEX QPLACE
 0265   REF   1              11,2357   3 2361 1           CAF   TESTCADR
 0266   REF   3 LAST 179     11,2360   0 5230 0           TC    BANKJUMP

R0267          DON'T USE 13 OR 14 (SEE NOTE ON USER'S PAGE 1).

 0268   REF   4 LAST 202     11,2361    22066 1  TESTCADR CADR  ALM/END     0  ILLEGAL
 0269   REF   1              11,2362    50000 1           CADR  IMUTEST     1  GYRO DRIFT TEST
 0270   REF   1              11,2363    50025 0           CADR  IMUBACK     2 REPEAT OF IMUTEST
 0271   REF   1              11,2364    30000 1           CADR  AOTNBIMU    3  IMU ALIGNMENT TEST
 0272   REF   1              11,2365    50252 1           CADR  OPCHK       4  IMU CHECK
 0273   REF   1              11,2366    50451 1           CADR  GYRSFTST    5  GYRO TORQUING TEST
 0274   REF   5 LAST 210     11,2367    22066 1           CADR  ALM/END     6  AVAILABLE
 0275   REF   1              11,2370    73351 1           CADR  GTSCPSS     7. GYROCOMPASS
 0276   REF   1              11,2371    46556 0           CADR  SAMODCHK    10 SEMI-AUTOMATIC MODING CHECK
 0277   REF   1              11,2372    31347 0           CADR  SAJTOIFS    11 SEMI-AUTOMATIC INTERFACE TEST
 0278   REF   1              11,2373    31605 0           CADR  AOTANGCK    12 AOT ANGLE CHECK
```

L EXTENDED VERBS USER'S OWN PAGE NO. 12 S3 E5

```
0279  REF   1                 11,2374   31143 0              CADR   RDRINIT     13 RENDEZVOUS RADAR / ANTENNAE TRACKING
0280  REF   1                 11,2375   22410 1              CADR   FSTRSAMP    14 HIGH SPEED RADAR SAMPLING.

0281  REF   1                 11,2376   31636 0              CADR   ZERODERAS
0282  REF   1                 11,2377   23007 1              CADR   DISINDT     DISPLAY INERTIAL DATA TEST.
0283  REF   6 LAST 210       11,2400   22066 1              CADR   ALM/END
0284  REF   7 LAST 211       11,2401   22066 1              CADR   ALM/END
0285                          11,2402   02101 0  TESTNV      OCT    2101
0286  REF   4 LAST 210       11,2403   02546 1  LOPL        ECADR  QPLACE
0287  REF  10 LAST 207       11,2404   0 5225 1 GOSHOSJM    TC     POSTJUMP    START ROUTINE TO DISPLAY SUM OF EACH
0288  REF   1                 11,2405   77543 0              CADR   SHOWSUM     BANK ON DSKY

0289  REF  11 LAST 211       11,2406   0 5225 1 DOFCSTST    TC     POSTJUMP
0290  REF   1                 11,2407   14736 0              CADR   FCSSTART
```

L EXTENDED VERBS USER'S OWN PAGE NO. 13 S3 E5

```
P0291           SET UP FOR RADAR SAMPLING.

0292   REF   9 LAST 199                    E7          EBANK= RSTCTOC

0293   REF   1                  11,2410  3 2477 1  FSTRSAMP CAF    RSTCTIST    HIGH SPEED SAMPLING. SWITCH TO SPECIAL
0294   REF   2 LAST  98         11,2411  54 411 1            TS     DNLSTADR    DOWNLIST.
0295   REF  33 LAST 199         11,2412  4 7763 0            CS     ONE         WANTS TM BUFFERING.
0296   REF   1                  11,2413  1 2416 1            TCF    RSAMPTST

0297   REF   6 LAST 210         11,2414  0 4644 0  REGRSAMP  TC     GRABWAIT
0298   REF   1                  11,2415  3 5205 0            CAF    1SEC+1      SHOWS NO TM BUFFERING.

0299   REF  70 LAST 210         11,2416  54 146 0  RSAMPTST  TS     MPAC +2
0300                            11,2417  0 0004 0            INHINT
0301   REF   1                  11,2420  4 2500 1            CS     LRPOSCAL    INITIALIZE SCALE AND LR POSITION BITS.
0302   REF  68 LAST 197         11,2421  7 0412 1            MASK   RADMODES
0303   REF  59 LAST 212         11,2422  54 412 1            TS     RADMODES

0304   REF   2 LAST 212         11,2423  3 2500 0            CAF    LRPOSCAL
0305                            11,2424  0 0006 1            EXTEND
0306                            11,2425  02 033 0            RAND   33
0307   REF  70 LAST 212         11,2426  26 412 1            ADS    RADMODES

0308                            11,2427  0 0003 1            RELINT
0309   REF   1                  11,2430  3 2451 0            CAF    LRTSTDEX
0310   REF  10 LAST 153         11,2431  54 003 0            TS     EBANK
0311   REF  71 LAST 212         11,2432  56 146 1            XCH    MPAC +2
0312   REF   3 LAST 199         11,2433  55'445 1            TS     RSAMPDT     HI SPEED NNZ - LO SPEED PNZ.
0313   REF  49 LAST 209         11,2434  3 7767 0            CAF    ZERO
0314   REF   4 LAST 198         11,2435  55'444 0            TS     RTSTLOC
0315   REF   2 LAST 198         11,2436  55'446 1            TS     RFAILCNT    ZERO BAD SAMPLE COUNTER.
0316   REF   1                  11,2437  3 2475 0            CAF    HISPMAX
0317   REF   2 LAST 198         11,2440  55'442 0            TS     RTSTMAX

0318   REF   1                  11,2441  3 2476 0            CAF    RTSTNV
0319   REF  14 LAST 210         11,2442  0 4657 1            TC     NVSBWAIT
0320   REF  11 LAST 210         11,2443  0 4475 0            TC     ENDIDLE
0321   REF   2 LAST 210         11,2444  0 5566 1            TC     EJFREE      ON TERMINATE.
0322   REF   1                  11,2445  1 2501 0            TCF    RSEMIAUT    PROCEED MEANS SEMI-AUTO SEQUENCING.
0323   REF   5 LAST 208         11,2446  0 4724 1  RORDFREE  TC     FREEDSP
0324   REF   4 LAST 212         11,2447  11'445 1            CCS    RSAMPDT     SEE IF HI OR LO SPEED SAMPLING.
0325                            11,2450  1 2454 1            TCF    +4

0326   REF   3 LAST 199         11,2451   03441 0  LRTSTDEX ECADR  RTSTDEX

0327   REF  12 LAST 211         11,2452  0 5225 1            TC     POSTJUMP    EXEC. OTHERWISE, SET UP WAITLIST TIMING.
0328   REF   3 LAST 199         11,2453   21301 0            CADR   DORSAMP

0329   REF   4 LAST 199         11,2454  3 6306 1            CAF    SIX         FIND OUT WHICH RADAR WANTED.
0330   REF   4 LAST 212         11,2455  7 1441 0            MASK   RTSTDEX
```

```
L       EXTENDED VERBS                                                  USER'S OWN PAGE NO. 14          S3  E7

 0331   REF 128 LAST 205    11,2456  10 000 0            CCS     A
 0332   REF   1             11,2457  1 2463 0            TCF     LRCYCLE     LANDING RADAR ARE SERIALS 2 - 5.

 0333   REF   2 LAST 198    11,2460  55'443 1            TS      RTSTBASE    FOR RR BASE = 0, MAX = 1.
 0334   REF   5 LAST 212    11,2461  3 6306 1            CAF     SIX
 0335                       11,2462  1 2466 0            TCF     +4

 0336   REF  16 LAST 205    11,2463  3 7762 0  LRCYCLE   CAF     TWO         FOR LR BASE = 2, MAX = 3.
 0337   REF   3 LAST 213    11,2464  55'443 1            TS      RTSTBASE
 0338   REF   1             11,2465  3 2474 1            CAF     18R

 0339   REF   3 LAST 212    11,2466  55'442 0  +4        TS      RTSTMAX
 0340                       11,2467  0 0004 0            INHINT
 0341   REF  23 LAST 198    11,2470  0 5663 1            TC      WAITLIST
 0342   REF  10 LAST 212                 E7             EBANK=  RSTKLOC
 0343                       11,2471   03261 1            2CADR   RADSAMP
C0343   REF   2 LAST 198    11,2472   20067 1
 0344   REF  18 LAST 210    11,2473  0 5567 0            TC      ENDOFJOB

 0345                       11,2474   00022 1  18R       DEC     18
 0346                       11,2475   00102 1  HISPMAX   DEC     66
 0347                       11,2476   02101 0  RTSTNV    OCT     2101
 0348   REF   1             11,2477   02236 1  RSTKLIST  GENADR  JPDNLIST
 0349                       11,2500   00444 0  LRPOSCAL  OCT     444
```

L EXTENDED VERBS USER'S OWN PAGE NO. 15 S3 E7

P0350 SEMI-AUTO RADAR TESTING.

```
0351                          11,2501  0 0004 0  RSEMIAJT INHINT
0352  REF   2 LAST 198       11,2502  3 5647 1           CAF    PRIO25        START HI SPEED SAMPLING.
0353  REF   6 LAST 198       11,2503  0 5505 1           TC     NOVAC
0354  REF  11 LAST 213                     E7           EBANK= RST<LOC
0355                          11,2504   03301 0          2CADR  DORSAMP
C0355 REF   4 LAST 212       11,2505   20067 1
0356                          11,2506  0 0003 1          RELINT
0357  REF   2 LAST  99       11,2507  3 7766 1           CAF    FIVE          SEQUENCE THROUGH ALL SIX CHANNELS.
0358  REF   5 LAST 212       11,2510  55'441 0   -1      TS     RTSTNDEX

0359  REF   1                 11,2511  3 2527 0  33PASTE  CAF    RV33          ON ENTER, SWITCH TO NEXT CHANNEL.
0360  REF  15 LAST 212        11,2512  0 4657 1           TC     NVSBWAIT
0361  REF   2 LAST 160        11,2513  0 4622 0           TC     FLASHON
0362  REF  12 LAST 212        11,2514  0 4475 0           TC     ENDIDLE
0363  REF   1                 11,2515  0 2522 0           TC     ENDRTST       ON TERMINATE.
0364                          11,2516  1 2520 0           TCF    +2
0365  REF   1                 11,2517  1 2511 1           TCF    33PASTE       DONT ACCEPT DATA.

0366  REF   6 LAST 214        11,2520  11'441 0           CCS    RTSTNDEX
0367  REF   2 LAST 214        11,2521  1 2510 0           TCF    33PASTE -1

0368  REF  50 LAST 212        11,2522  3 7767 0  ENDRTST  CAF    ZERO          ENDTEST.
0369  REF   5 LAST 212        11,2523  55'445 1           TS     RSAMPDT
0370  REF   2 LAST 210        11,2524  0 4117 1           TC     NEWMODEX
0371                          11,2525   00000 1           OCT    0
0372  REF   3 LAST 212        11,2526  0 5566 1           TC     EJFREE

0373                          11,2527   03300 1  RV33     OCT    3300
```

L EXTENDED VERBS USER'S OWN PAGE NO. 16 S3 E7

```
P0374           JOB TO: 1) TURN OFF USE OF TRIM GIMBAL.  2) 5 SECONDS LATER, TURN OFF DAP, & SET UP SPECIAL DOWN-LINK
R0376   PROGRAM TO TRANSMIT A STEADY LIST OF CDUY & Z.  THE DOWN-LINK PROGRAM ALSO HAS THE DUTY OF TURNING THE DAP BACK
R0378   ON AND ENABLING USE OF THE TRIM GIMBAL AGAIN.

0379                            11,2530  0 0004 0  BEGINCDU  INHINT
0380    REF   1                 11,2531  3 2564 1            CA      FIVESECS        TURN OFF DAP IN 5 SECS
0381    REF  24 LAST 213        11,2532  0 5663 1            TC      WAITLIST
0382    REF   6 LAST  70                    E7                EBANK=  DNTMBUFF
0383                            11,2533    02552 1            2CADR   DAPOFF
C0383   REF   3 LAST  69        11,2534    22067 0
0384    REF   2 LAST 101        11,2535  3 1310 1            CA      DVSELECT        SAVE OLD CONTENTS OF DVSELECT.
0385    REF   2 LAST 101        11,2536  55'346 0            TS      OLDDVSEL

0386    REF   2 LAST  81        11,2537  0 4161 0            TC      PHASCHNG
0387                            11,2540    40026 1            OCT     40026           6.2 FOR DAPOFF TASK & TGOFF JOB.

0388                            11,2541  0 0004 0  TGOFF      INHINT
0389    REF   1                 11,2542  4 0077 0            CS      DAPBOOLS        INHIBIT USE OF TRIM GIMBAL IMMEDIATELY.
0390    REF   1                 11,2543  7 7762 1            MASK    USEDRJTS
0391    REF   2 LAST 215        11,2544  26 077 0            ADS     DAPBOOLS

0392    REF   1                 11,2545  3 2562 1            CA      LPNGSMON        PREVENT GIMBLMON FROM TURNING TRIM
0393    REF   3 LAST 215        11,2546  55'310 0            TS      DVSELECT        GIMBAL BACK ON.

0394    REF   3 LAST 215        11,2547  0 4161 0            TC      PHASCHNG
0395                            11,2550    00036 1            OCT     00036           6.3 FOR DAPOFF TASK.

0396    REF  19 LAST 213        11,2551  1 5567 1            TCF     ENDOFJOB

0397    REF   7 LAST 215                    E7                EBANK=  DNTMBUFF

0398    REF   1                 11,2552  3 2563 0  DAPOFF     CA      LDNCDUS         SET DNTMGOTO TO INITIATE THE SENDING OF
0399    REF   4 LAST  99        11,2553  55'401 1            TS      DNTMGOTO        CDUY & Z.

0400    REF   1                 11,2554  4 7751 1            CS      GODAPGO         TURNING OFF GODAPGO TURNS OFF DAP.
0401    REF   3 LAST 215        11,2555  7 0077 0            MASK    DAPBOOLS
0402    REF   4 LAST 215        11,2556  54 077 0            TS      DAPBOOLS

0403    REF   4 LAST 215        11,2557  0 4161 0            TC      PHASCHNG
0404                            11,2560    00006 1            OCT     00006

0405    REF  17 LAST 198        11,2561  1 5727 1            TCF     TASKOVER

0406    REF   2 LAST 102        11,2562    02237 0  LPNGSMON  GENADR  PGNCSMON
0407    REF   1                 11,2563    02354 1  LDNCDUS   GENADR  DNCDUS
0408                            11,2564    00764 1  FIVESECS  DEC     500
```

L EXTENDED VERBS USER'S OWN PAGE NO. 17 53 E7

P0409 VB 43 IMU ATTITUDE ERROR METER LOADER.

```
0410   REF   8 LAST 208    11,2565  0 2040 1  IMUATTCK  TC      TESTxACT
0411   REF   1             11,2566  4 2631 0            CS      OCT50K          REMOVE COARSE AND ECTR ENABLE.
0412                       11,2567  0 0006 1            EXTEND
0413                       11,2570  03 012 1            WAND    12

0414   REF   7 LAST 212    11,2571  0 4644 0            TC      GRABWAIT
0415   REF   2 LAST 204    11,2572  3 2152 0            CAF     VNLODCDU
0416   REF  16 LAST 214    11,2573  0 4657 1            TC      NVSBWAIT
0417   REF  13 LAST 214    11,2574  0 4475 0            TC      ENDIDLE
0418   REF   7 LAST 208    11,2575  0 2055 0            TC      TERMEXTV
0419                       11,2576  0 2577 0            TC      +1
0420   REF   1             11,2577  3 2632 1            CAF     V43K            REDISPLAY OUR VERB.
0421   REF  17 LAST 216    11,2600  0 4657 1            TC      NVSBWAIT
0422   REF  18 LAST 195    11,2601  3 7756 1            CAF     BIT6            ENABLE ERROR COUNTER.
0423                       11,2602  0 0006 1            EXTEND
0424                       11,2603  05 012 1            WOR     12
0425   REF  17 LAST 213    11,2604  3 7762 0            CAF     TWO
0426                       11,2605  0 0004 0            INHINT
0427   REF  25 LAST 215    11,2606  0 5663 1            TC      WAITLIST        PUT OUT COMMAND IN .32 SECS.
0428   REF  12 LAST 214                 E7              EBANK=  RSTRTOC
0429                       11,2607   02612 0            2CADR   ATTCK2
C0429  REF   1             11,2610   22067 0
0430   REF   8 LAST 216    11,2611  1 2055 1            TCF     TERMEXTV        FREES DISPLAY.

0431   REF  18 LAST 216    11,2612  3 7762 0  ATTCK2    CAF     TWO             PUT OUT ALL COMMANDS - CDU WILL DO LIMIT
0432   REF  57 LAST 205    11,2613  54 002 1            TS      Q               INCASE OF EXCESS DATA.
0433   REF 129 LAST 213    11,2614  50 000 1            INDEX   A
0434   REF   4 LAST 205    11,2615  3 0400 0            CA      THETAD
0435                       11,2616  0 0006 1            EXTEND
0436   REF  16 LAST 196    11,2617  7 7747 0            MP      BIT13           SHIFT RIGHT 2.
0437   REF   4 LAST 176    11,2620  6 7770 0            AD      NEGO            PREVENT +0 IN OUTPUT COUNTER
0438   REF  58 LAST 216    11,2621  50 002 0            INDEX   Q
0439   REF   3 LAST 142    11,2622  54 050 0            TS      CDUXCMD
0440   REF  59 LAST 216    11,2623  10 002 1            CCS     Q
0441   REF   2 LAST 216    11,2624  1 2613 0            TCF     ATTCK2 +1

0442   REF   1             11,2625  3 2633 0            CAF     OCT70K
0443                       11,2626  0 0006 1            EXTEND
0444                       11,2627  05 014 1            WOR     14
0445   REF  18 LAST 215    11,2630  1 5727 1            TCF     TASKOVER

0446                       11,2631   00050 1  OCT50K    OCT     50
0447                       11,2632   04300 0  V43K      OCT     4300
0448                       11,2633   70000 0  OCT70K    OCT     70000
```

L EXTENDED VERBS USER'S OWN PAGE NO. 18 S3 E7

```
P0449          PROGRAM TO SCAN CHANNELS 30 - 32 FOR CHANGES IN SELECTED INBITS. CALLED BY SPECIAL VERB.

 0451   REF   1                          E7          EBANK=  MSGCNT

 0452   REF  20 LAST 191     11,2634  3 7763 1  SETUPMSG CAF     BIT1          BEGIN SCAN.
 0453                       11,2635  0 0004 0           INHINT
 0454   REF  26 LAST 216     11,2636  0 5663 1           TC      WAITLIST
 0455   REF  13 LAST 216                E7          EBANK=  RSTRTLOC
 0456                       11,2637    02644 0          2CADR   MSGSCAN +2
C0456   REF   1             11,2640    22067 0
 0457   REF  20 LAST 215     11,2641  0 5567 0           TC      ENDOFJOB

 0458   REF  10 LAST 196     11,2642  0 5701 1  MSGSCAN  TC      FIXDELAY
 0459                       11,2643    00062 0          DEC     50

 0460   REF  19 LAST 216     11,2644  3 7762 0           CAF     TWO           SCAN ALL 3 CHANNELS FOR CHANGES.
 0461   REF   2 LAST 217     11,2645  55'562 0           TS      MSGCNT
 0462   REF 130 LAST 216     11,2646  50 000 1           INDEX   A
 0463   REF   1              11,2647  3 1557 1           CA      LAST30        OLD VALUE OF INBITS.
 0464                       11,2650  0 0006 1           EXTEND
 0465   REF   3 LAST 217     11,2651  5 1562 1           INDEX   MSGCNT
 0466                       11,2652  06 030 1           RXOR    30
 0467   REF   4 LAST 217     11,2653  51'562 1           INDEX   MSGCNT
 0468   REF   1              11,2654  7 2703 0           MASK    30MSGMSK
 0469                       11,2655  0 0006 1           EXTEND
 0470   REF   1              11,2656  1 2700 0           BZF     NOMSG

 0471   REF  60 LAST 216     11,2657  54 002 1           TS      Q             SAVE DIFFERENCE.
 0472   REF   5 LAST 217     11,2660  51'562 1           INDEX   MSGCNT
 0473   REF   2 LAST 217     11,2661  23'557 1           LXCH    LAST30        UPDATE OLD VALUE.
 0474                       11,2662  0 0006 1           EXTEND
 0475   REF  47 LAST 209     11,2663  06 001 0           RXOR    L
 0476   REF   6 LAST 217     11,2664  51'562 1           INDEX   MSGCNT
 0477   REF   3 LAST 217     11,2665  55'557 0           TS      LAST30

 0478                       11,2666  4 0000 0           COM
 0479   REF  61 LAST 217     11,2667  56 002 0           XCH     Q
 0480   REF  62 LAST 217     11,2670  7 0002 1           MASK    Q             SEE IF ANY OF CHANGED BITS JUST ON.
 0481                       11,2671  0 0006 1           EXTEND
 0482   REF   2 LAST 217     11,2672  1 2700 0           BZF     NOMSG         NO MESSAGE IF SO.

R0483          NO ROTATIONAL HAND CONTROLLER IN 206.

 0484   REF   1              11,2673  3 2706 1  NOTRHC   CAF     OCT30
 0485   REF   7 LAST 217     11,2674  6 1562 1           AD      MSGCNT
 0486   REF  27 LAST 164     11,2675  54 071 0           TS      RUPTREG2

 0487   REF  63 LAST 217     11,2676  4 0002 1           CS      Q
 0488   REF   1              11,2677  0 2724 1           TC      VMESSAGE
```

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```
0489  REF   8 LAST 217   11,2700  11,562 0  NOMSG     CCS   MSGCNT
0490  REF   2 LAST 217   11,2701  1 2645 0            TCF   MSGSCAN +3
0491  REF   3 LAST 218   11,2702  1 2642 1            TCF   MSGSCAN

0492                      11,2703   00017 1  BOMSGMSK  OCT   17
0493                      11,2704   77777 0            OCT   77777
0494                      11,2705   03777 0            OCT   3777

0495                      11,2706   00030 1  OCT30     OCT   30
0496  REF   1             11,2707  0 2717 1  DESCBITS  TC    MESSAGE        DESCENT BITS COME HERE IN A.
0497                      11,2710   00016 0            OCT   16
0498  REF  12 LAST 190    11,2711  0 5733 0            TC    RESJME

0499  REF   8 LAST 216    11,2712  0 4644 0  RHCMON    TC    GRABWAIT       FIRE UP DSKY MONITOR.
0500  REF   1             11,2713  3 2716 0            CAF   RHCMONVN
0501  REF  18 LAST 216    11,2714  0 4657 1            TC    NVSBWAIT
0502  REF   4 LAST 214    11,2715  0 5566 1            TC    EJFREE

0503                      11,2716   01645 1  RHCMONVN  OCT   1645
```

L EXTENDED VERBS USER'S OWN PAGE NO. 20 S3 E7

P0504 MESSAGE DISPLAY - 3 COMPONENT OCTAL.

```
0505  REF  28 LAST 217    11,2717  54 071 0  MESSAGE   TS      RUPTREG2        NEW CHANNEL CONTENTS ARRIVE IN A.
0506  REF  54 LAST 217    11,2720  50 002 0            INDEX   Q               CHANNEL NUMBER IN OCTAL AT CALLER +1.
0507                      11,2721  3 0000 1            CAF     0
0508  REF  55 LAST 219    11,2722  24 002 0            INCR    Q
0509  REF  29 LAST 219    11,2723  56 071 1            XCH     RUPTREG2

0510  REF  32 LAST 164    11,2724  54 070 1  VMESSAGE  TS      RUPTREG1        FOR VARIABLE CHANNEL.
0511                      11,2725  0 0006 1            EXTEND
0512  REF   9 LAST 156    11,2726  22 072 1            QXCH    RUPTREG3
0513  REF   1             11,2727  3 5651 0            CAF     PRIO27          FIRE UP SPECIAL JOB.
0514  REF   7 LAST 214    11,2730  0 5505 1            TC      NOVAC
0515  REF  14 LAST 217                 E7             EBANK=  RSTKLOC
0516                      11,2731    02742 1           2CADR   DOMSG
0516  REF   1             11,2732    22067 0
0517  REF  33 LAST 219    11,2733  52 071 0            QXCH    RUPTREG1        NEW CONTENTS TO MPAC - CHANNEL NUMBER TO
0518  REF   3 LAST 166    11,2734  50 064 0            INDEX   LOCCTR          MPAC +1.
0519  REF  72 LAST 212    11,2735  52 145 0            QXCH    MPAC
0520  REF   6 LAST  87    11,2736  3 0025 0            CA      TIME1
0521  REF   4 LAST 219    11,2737  50 064 0            INDEX   LOCCTR
0522  REF  73 LAST 219    11,2740  54 146 0            TS      MPAC +2
0523  REF  10 LAST 219    11,2741  0 0072 1            TC      RUPTREG3

0524  REF   9 LAST 218    11,2742  0 4644 0  DOMSG     TC      GRABWAIT
0525                      11,2743  0 0006 1            EXTEND
0526  REF  74 LAST 219    11,2744  3 0145 1            QCA     MPAC
0527  REF   2 LAST 209    11,2745  52 340 1            QXCH    DSPTEM1
0528  REF  75 LAST 219    11,2746  3 0146 1            CA      MPAC +2
0529  REF   3 LAST 219    11,2747  54 341 0            TS      DSPTEM1 +2
0530  REF   1             11,2750  3 2757 0            CAF     MSGVN
0531  REF   2 LAST 166    11,2751  0 4444 1            TC      NVSJR
0532  REF   1             11,2752  1 2754 1            TCF     MSGBUSY
0533  REF   5 LAST 218    11,2753  0 5566 1            TC      EJERFE

0534                      11,2754  3 2756 1  MSGBUSY   CAF     +2
0535  REF   1             11,2755  0 4654 1            TC      NVSJBUSY
0536  REF   2 LAST 219    11,2756    22743 1           CADR    DOMSG +1

0537                      11,2757    00535 1  MSGVN    OCT     0535
```

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P0538 ROUTINE FOR AURORA ONLY TO ASK OPERATOR IF RR LOCK ON REQUESTED.

```
0540  REF   3 LAST 181   11,2760  0 5235 0  AJRLOKON TC    MAKECADR
0541  REF   6 LAST 181   11,2761  54 426 0           TS    DESRET
0542  REF   2 LAST 214   11,2762  3 2527 0           CAF   RV33          ASSUMES DSKY GRABBED.
0543  REF  19 LAST 218   11,2763  0 4657 1           TC    NVSBWAIT
0544  REF   3 LAST 214   11,2764  0 4622 0           TC    FLASHON
0545  REF  14 LAST 216   11,2765  0 4475 0           TC    ENDIDLE
0546                     11,2766  1 2771 0           TCF   +3            ON TERM.
0547  REF   2 LAST 186   11,2767  3 7757 0           CAF   LOKONFLG
0548                     11,2770  1 2772 0           TCF   +2
0549  REF  51 LAST 214   11,2771  3 7767 0           CAF   ZERO
0550                     11,2772  0 0004 0           INHINT
0551  REF  21 LAST 186   11,2773  56 074 1           KCH   STATE
0552  REF   1            11,2774  7 3006 0           MASK  -LOKONFG
0553  REF  22 LAST 220   11,2775  26 074 0           ADS   STATE

0554  REF   3 LAST 220   11,2776  7 7757 1           MASK  LOKONFLG      IF NO LOCK-ON CALLED FOR, SET BIT15 OF
0555  REF 131 LAST 217   11,2777  10 000 0           CCS   A             RADMODES TO INDICATE THAT ARBITRARILY-
0556                     11,3000  1 3003 0           TCF   +3            LONG DESIGNATION IS WANTED (TO BE

0557  REF  15 LAST 174   11,3001  3 7745 0           CAF   BIT15         TERMINATED BY FRESH START).
0558  REF  71 LAST 212   11,3002  26 412 1           ADS   RADMODES

0559                     11,3003  0 0003 1           RELINT
0560  REF   7 LAST 220   11,3004  3 0426 1           CA    DESRET
0561  REF   4 LAST 210   11,3005  1 5230 1           TCF   BANKJUMP

0562                     11,3006   77757 1  -LOKONFG OCT   -20
```

L EXTENDED VERBS USER'S OWN PAGE NO. 22 S3 E7

P0563 PROGRAM TO RUN DISPLAY INERTIAL DATA TEST.

```
 0564   REF   1                 11,3007  3 3077 1  DISINDT  CAF     FLVELVN          ASK FOR FORWARD, LATERAL VELOCITY.
 0565   REF  20 LAST 220        11,3010  0 4657 1           TC      NVSBWAIT
 0566   REF  15 LAST 220        11,3011  0 4475 0           TC      ENDIDLE
 0567   REF   1                 11,3012  1 3034 1           TCF     ENDDTSIN
 0568                           11,3013  1 3014 0           TCF     +1
 0569   REF   1                 11,3014  3 3100 0           CAF     ALT,R,VN         ASK FOR INITIAL AND FINIAL ALTITUDES AND
 0570   REF  21 LAST 221        11,3015  0 4657 1           TC      NVSBWAIT         ALTITUDE RATE.
 0571   REF  16 LAST 221        11,3016  0 4475 0           TC      ENDIDLE
 0572   REF   2 LAST 221        11,3017  1 3034 1           TCF     ENDDTSIN
 0573                           11,3020  1 3021 0           TCF     +1

 0574                           11,3021  0 0004 0           INHINT
 0575   REF  34 LAST 212        11,3022  4 7763 0           CS      ONE
 0576   REF   5 LAST 110        11,3023  54 350 0           TS      DIDFLG

 0577                           11,3024  0 0006 1           EXTEND
 0578   REF   4 LAST 109        11,3025  3 0352 0           DCA     ALT              SO FOLLOWING MONITOR WORKS.
 0579   REF  11 LAST 109        11,3026  52 364 1           DXCH    ALTSAVE

 0580   REF  35 LAST 221        11,3027  3 7763 1           CAF     ONE
 0581   REF  27 LAST 217        11,3030  0 5663 1           TC      WAITLIST
 0582   REF  15 LAST 219                       E7          EBANK=  RSTKLOC
 0583                           11,3031   03042 1          2CADR   DISINLUP +2
C0583   REF   1                 11,3032   22067 0
 0584   REF   6 LAST 219        11,3033  1 5566 0           TCF     EJFREE

 0585   REF   6 LAST 212        11,3034  0 4724 1  ENDDISIN TC      FREEDSP
 0586   REF   3 LAST 214        11,3035  0 4117 1    +1     TC      NEWMODEX
 0587                           11,3036   00000 1          DCT     0

 0588   REF  21 LAST 217        11,3037  0 5567 0           TC      ENDOFJOB
```

L EXTENDED VERBS USER'S OWN PAGE NO. 23 S3 E7

```
P0589          WATCH ALTSAVE FOR END OF PROBLEM.

0590   REF  11 LAST 217      11,3040  0 5701 1  DISINLJP TC      FIXDELAY
0591                         11,3041   00062 0           DEC     50

0592                         11,3042  0 0006 1  +2       EXTEND
0593   REF   1               11,3043  3 0355 1           DCA     FINALT
0594   REF  47 LAST 194      11,3044  52 062 1           DXCH    ITEMP1
0595                         11,3045  0 0006 1           EXTEND
0596   REF  12 LAST 221      11,3046  4 0364 1           DCS     ALTSAVE      LATEST ALTITUDE.
0597   REF  48 LAST 222      11,3047  20 062 1           DAS     ITEMP1

0598   REF  49 LAST 222      11,3050  10 061 1           CCS     ITEMP1
0599   REF   1               11,3051  1 3071 0           TCF     +DIF
0600                         11,3052  1 3054 1           TCF     +2
0601   REF   1               11,3053  1 3075 1           TCF     -DIF

0602   REF  22 LAST 176      11,3054  10 062 1           CCS     ITEMP2
0603   REF   2 LAST 222      11,3055  1 3071 0           TCF     +DIF
0604                         11,3056  1 3060 0           TCF     +2
0605   REF   2 LAST 222      11,3057  1 3075 1           TCF     -DIF

0606   REF  52 LAST 220      11,3060  3 7767 0  DISINDJN CAF     ZERO
0607   REF   3 LAST 110      11,3061  54 353 0           TS      ALTRATE
0608   REF   2 LAST 222      11,3062  52 355 0           DXCH    FINALT
0609   REF   5 LAST 221      11,3063  52 352 1           DXCH    ALT
0610   REF   3 LAST 210      11,3064  3 7746 0           CAF     PRIO20
0611   REF   8 LAST 219      11,3065  0 5505 1           TC      NOVAC
0612   REF  16 LAST 221                    E7           EBANK=  RSTKLOC
0613                         11,3066   03035 1           2CADR   ENDDISIN +1
C0613  REF   3 LAST 221      11,3067   22067 0
0614   REF  19 LAST 216      11,3070  1 5727 1           TCF     TASKOVER

0615   REF   4 LAST 222      11,3071  3 0353 1  +DIF     CA      ALTRATE
0616                         11,3072  0 0006 1           EXTEND
0617   REF   1               11,3073  6 3060 1           BZMF    DISINDUN
0618   REF   2 LAST 221      11,3074  1 3040 1           TCF     DISINLUP

0619   REF   5 LAST 222      11,3075  4 0353 0  -DIF     CS      ALTRATE
0620   REF   3 LAST 222      11,3076  1 3072 0           TCF     +DIF +1

0621                         11,3077   02444 1  FLVELVN  DCT     2444
0622                         11,3100   02564 1  ALT.R.VN DCT     2564

0623                         11,3101  0 0004 0  MINIMP   INHINT
0624   REF  21 LAST 186      11,3102  4 7752 1           CS      BIT10        BIT 10 OF DAPBOOLS INDICATES MINIMP MODE
0625   REF   5 LAST 215      11,3103  7 0077 0           MASK    DAPBOOLS
0626   REF  22 LAST 222      11,3104  6 7752 0           AD      BIT10
0627   REF   6 LAST 222      11,3105  54 077 0           TS      DAPBOOLS     BIT 10 OF DAPBOOLS NOW PRESENT.
0628   REF  22 LAST 221      11,3106  1 5567 1           TCF     ENDOFJOB
```

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```
0629                          11,3107  0 0004 0  NOMINIMP INHINT
0630   REF  23 LAST 222       11,3110  4 7752 1        CS    BIT10
0631   REF   7 LAST 222       11,3111  7 0077 0        MASK  DAPBOOLS
0632   REF   8 LAST 223       11,3112 54 077 0        TS    DAPBOOLS     A ZERO IN POSITION 10 OF DAPBOOLS NOW.

0633                          11,3113  0 0006 1        EXTEND
0634   REF   7 LAST 163       11,3114  3 0033 1        DCA   CDUX
0635   REF   3 LAST  24       11,3115 52 767 0        DXCH  CDUXD
0636   REF   6 LAST 163       11,3116  3 0034 0        CA    CDUZ
0637   REF   1                11,3117 54 770 0        TS    CDUZD
0638   REF  23 LAST 222       11,3120  1 5567 1        TCF   ENDOFJOB
```

L EXTENDED VERBS USER'S OWN PAGE NO. 25 S3 E7

P0639 VB 60 PREPARE FOR STANDBY OPERATION

R0640 ROUTINE WRITTEN FOR TEST ROPES ONLY*** MUST BE UPDATED TO INCLUDE
R0641 FLIGHT REQUIREMENTS FOR FLIGHT OPERATION

```
0642  REF  27 LAST 103                E3              EBANK= TST1

0643  REF   1                 11,3121  3 5352 0  PRESTAND CAF    EBANK3          COMES HERE FROM LST2FAN
0644  REF  11 LAST 212        11,3122  56 003 1           XCH    EBANK           SET UP EBANK FOR BANK 3
0645                          11,3123  0 0004 0           INHINT
0646  REF   7 LAST 219        11,3124  3 0025 0           CA     TIME1
0647  REF   1                 11,3125  55,506 1           TS     TIMESAV         THIS ROUTINE WILL LOOK AT TIME1 UNTIL
0648  REF   2 LAST 217        11,3126  3 2706 1           CAF    OCT30            TIME1 IS INCREMENTED. THEN IT WILL
0649  REF   1                 11,3127  55,512 1  LONGER   TS     TIMAR           SNATCH THE MISSION TIME REGS AND STORE
0650  REF   2 LAST 224        11,3130  4 1506 1           CS     TIMESAV         THEN IN TIMESAV FOR LATER ISE IN ARITH.
0651  REF   8 LAST 224        11,3131  6 0025 0           AD     TIME1           OPERATIONS WHICH SHOULD FIND THE
0652                          11,3132  0 0006 1           EXTEND                 STANDING DIFFERENCE BETWEEN THE SCALAR
0653  REF   1                 11,3133  1 3140 0           BZF    CHKTIME         AND THE TIME1-TIME2S REGS.

0654                          11,3134  0 0006 1           EXTEND
0655  REF   7 LAST 209        11,3135  3 0025 0           DCA    TIME2           READ AND STORE THE DP TIME AND DO
0656  REF   3 LAST 224        11,3136  53,507 0           DXCH   TIMESAV         READ THE SCALAR USING THE EXISTING PROG
0657  REF   1                 11,3137  1 3146 0           TCF    CATCHFIN        FINETIME.

0658  REF   2 LAST 224        11,3140  11,512 1  CHKTIME  CCS    TIMAR           MUST WATCH THE TIME SPENT IN INHINT OR
0659  REF   1                 11,3141  0 3127 0           TC     LONGER          THE COPS MIGHT CATCH US.
0660                          11,3142  0 0003 1           RELINT
0661  REF   2 LAST  97        11,3143  10 067 1           CCS    NEWJOB
0662  REF   1                 11,3144  0 5532 0           TC     CHANG1
0663  REF   2 LAST 224        11,3145  0 3126 1           TC     LONGER -1       GO BACK AND LOOK AGAIN

0664  REF   1                 11,3146  0 5026 0  CATCHFIN TC     FINETIME        WILL READ CHANNELS 3 AND 4 AND RETURN
0665  REF   1                 11,3147  53,511 1           DXCH   SCALSAV         WITH 3 IN A AND 4 IN L..
0666                          11,3150  0 0003 1           RELINT
0667  REF  18 LAST 191        11,3151  4 7760 0           CS     BIT4
0668  REF  53 LAST 155        11,3152  7 0365 0           MASK   IMODES30        INHIBIT THE IMU FAIL LIGHT.
0669  REF  19 LAST 224        11,3153  6 7760 1           AD     BIT4
0670  REF  54 LAST 224        11,3154  54 365 0           TS     IMODES30

0671  REF  20 LAST 224        11,3155  3 7760 1           CAF    BIT4            SET ALL CHAN 12 BITS EXCEPT C/A TO ZERO.
0672                          11,3156  0 0006 1           EXTEND                 THIS IS NECESSARY SO THAT THE GIMBALS DO
0673                          11,3157  03 012 1           WAND   12              NOT DRIFT INTO GIMBALLOCK IF THE SYSTEM

0674  REF  21 LAST 224        11,3160  3 7760 1           CAF    BIT4            SHOULD BE IN OPERATE AT THE TIME STBY
0675                          11,3161  0 0006 1           EXTEND                 WAS STARTED.  THIS SECTION WILL MAKE
0676                          11,3162  05 012 1           WOR    12              SURE THE IMU IS IN C/A.....

0677  REF  15 LAST 190        11,3163  3 7751 0           CAF    BIT11           WHEN BIT 11 IS PRESENT IN CHANNEL 13 THE
0678                          11,3164  0 0006 1           EXTEND                 DSKY PB. CAN THEN ENERGIZE THE STANDBY
0679                          11,3165  05 013 0           WOR    13              RELAY IN THE CGC PWR SUPPLIES....
```

L EXTENDED VERBS USER'S OWN PAGE NO. 26 S3 E3

```
0680  REF  24 LAST 223     11,3166  0 5567 0          TC     ENDOFJOB        GO TO DUMMY JOB UNTIL YOU DIE...
```

L EXTENDED VERBS USER'S OWN PAGE NO. 27 53 E3

```
P0681   VB 61 RECOVER FROM STANDBY OPERATION

R0682   ROUTINE WRITTEN FOR TEST ROPES ONLY**** MUST BE UPDATED TO INCLUDE
R0683                 FLIGHT REQUIREMENTS FOR FLIGHT OPERATIONS SEQUENCES....

 0684   REF   2 LAST 224    11,3167   3 5352 0  POSTAND  CAF     EBANK3      COMES HERE FROM LST2FAN
 0685   REF  12 LAST 224    11,3170   56 003 1            XCH     EBANK       SET UP EBANK FOR BANK 3
 0686   REF   2 LAST 224    11,3171   0 5026 0            TC      FINETIME
 0687   REF   3 LAST 224    11,3172   53,513 0            DXCH    TIMAR       READ THE SCALAR AND SEE IF IT OVERFLOW-
 0688                        11,3173   0 0003 1            RELINT              ED WHILE THE CGC WAS IN STBY. IF SO
 0689   REF   4 LAST 226    11,3174   31,512 0            CAE     TIMAR       THE OVERFLOW MUST BE ADDED OR IT WILL
 0690                        11,3175   0 0006 1            EXTEND              SEEM THAT THE REALATIVITY THEORY WORKS
 0691   REF   2 LAST 224    11,3176   61,510 1            SU      SCALSAV     BETTER THAN IT SHOULD...
 0692                        11,3177   0 0006 1            EXTEND
 0693   REF   1             11,3200   6 3223 1            BZMF    ADDTIME     IF ITS NEG. IT MUST HAVE OVFLW..

 0694   REF   3 LAST 183    11,3201   0 6112 0            TC      INTPRET
 0695                        11,3202    45345 1            DLOAD   DSU         IF IT DID NOT OVFLW. FIND OUT HOW LONG
 0696   REF   5 LAST 226    11,3203    01513 1                    TIMAR       THE CGC WAS IN STBY BY SUBTRACTING THE
 0697   REF   3 LAST 226    11,3204    01511 0                    SCALSAV     SCALAR AT THE START OF STBY FROM THE
 0698                        11,3205    47061 0            SRR     RTB         SCALAR AT THE END OF STBY AND THEN ADD
 0699                        11,3206    21606 1                    5           THE DIFFERENCE TO THE TIME EXISTING
 0700   REF   1             11,3207    33520 0                    SGNAGREE    WHEN THE SCALAR WAS READ AT STBY ENTRY**
 0701                        11,3210    77615 0            DAD
 0702   REF   4 LAST 224    11,3211    01507 1                    TIMESAV
 0703   REF   6 LAST 226    11,3212    01513 1            STORE   TIMAR
 0704                        11,3213    77776 1            EXIT

 0705                        11,3214   0 0006 1  CORCTTIM EXTEND
 0706   REF   7 LAST 226    11,3215   3 1513 1            DCA     TIMAR       THIS IS THE CORRECTED TIME TO BE READ
 0707   REF   8 LAST 224    11,3216   52 025 1            DXCH    TIME2       INTO TIME1 AND TIME2 REGS. ADDR 24-25

 0708   REF  16 LAST 224    11,3217   4 7751 1            CS      BIT11
 0709                        11,3220   0 0006 1            EXTEND              DISABLE THE DSKY STBY PUSHBUTTON.
 0710                        11,3221   03 013 0            MASK    13
 0711   REF  25 LAST 225    11,3222   0 5567 0            TC      ENDOFJOB

 0712                        11,3223   0 0006 1  ADDTIME  EXTEND
 0713   REF   1             11,3224   3 7743 0            DCA     DPOSMAX     IF THE SCALAR OVERFLOWED, FIND OUT HOW
 0714   REF   1             11,3225   53,515 0            DXCH    TIMEDIFF    MUCH TIME REMAINED WHEN READ THE FIRST
 0715   REF   4 LAST 226    11,3226   0 6112 0            TC      INTPRET     TIME AND THEN ADD THE PRESENT READING-
 0716                        11,3227    45345 1            DLOAD   DSU         WHICH WILL BE THE TOTAL TIME SPENT IN
 0717   REF   2 LAST 226    11,3230    01515 1                    TIMEDIFF    STANDBY, TO WHICH THE TIME AT STBY
 0718   REF   4 LAST 226    11,3231    01511 0                    SCALSAV     MAY BE ADDED TO FIND THE PRESENT TIME
 0719                        11,3232    54215 0            DAD     SRR         CORRECT TO 10 MSEC..
 0720   REF   8 LAST 226    11,3233    01513 1                    TIMAR       **** THE TIME IN STANDBY MODE MUST NOT
 0721                        11,3234    21606 1                    5           EXCEED 23 HOURS IF TIME IS TO BE
 0722                        11,3235    77615 0            DAD                 CORRECTLY COMPUTED BY THIS ROUTINE.*****
 0723   REF   5 LAST 226    11,3236    01507 1                    TIMESAV
 0724   REF   9 LAST 226    11,3237    01513 1            STORE   TIMAR
```

L EXTENDED VERBS USER'S OWN PAGE NO. 28 S3 E3

```
0725                        11,3240   77776 1        EXIT
0726   REF   1              11,3241   0 3214 0       TC     CORCTTIM
```

L KEYRUPT, UPRUPT USER'S OWN PAGE NO. 1 S3

```
0001                                    13,3474                 BANK    13
0002  REF    4 LAST 189      13,3474  54 016 1  KEYRUPT1  TS      BANKRUPT
0003  REF   56 LAST 219      13,3475  56 002 0            XCH     Q
0004  REF    4 LAST 189      13,3476  54 012 0            TS      QRUPT
0005  REF    1              13,3477  0 4605 0            TC      LODSAMPT        TIME IS SNATCHED IN RUPT FOR NOUN 65.
0006  REF    1              13,3500  3 4556 0            CAF     LOW5
0007                        13,3501  0 0006 1            EXTEND
0008  REF    1              13,3502  02 015 1            RAND    MNKEYIN
0009  REF    8 LAST 167     13,3503  54 073 1  KEYCOM    TS      RUPTREG4
0010  REF    1              13,3504  3 5210 1            CAF     CHRPRIO
0011  REF    9 LAST 222     13,3505  0 5505 1            TC      NOVAC
0012  REF    2 LAST  98                    E0            EBANK=  DSPCOUNT
0013                        13,3506   02002 1            2CADR   CHARIN
C0013 REF    1              13,3507   10060 0
0014  REF    9 LAST 228     13,3510  3 0073 0            CA      RUPTREG4
0015  REF    5 LAST 219     13,3511  50 064 0            INDEX   LOCCTR
0016  REF   76 LAST 219     13,3512  54 144 1            TS      MPAC            LEAVE 5 BIT KEY CDE IN MPAC FOR CHARIN
0017  REF   13 LAST 218     13,3513  0 5733 0            TC      RESJME
```

L KEYRUPT, UPRUPT USER'S OWN PAGE NO. 2 S3

P0018 UPRUPT PROGRAM

```
0019  REF   5 LAST 228    13,3514  54 016 1  JPRUPT   TS    BANKRUPT
0020  REF  57 LAST 228    13,3515  56 002 0           XCH   Q
0021  REF   5 LAST 228    13,3516  54 012 0           TS    QRUPT
0022  REF   2 LAST 228    13,3517  0 4605 0           TC    LODSAMPT      TIME IS SNATCHED IN RUPT FOR NOJN 65.
0023  REF  53 LAST 222    13,3520  3 7767 0           CAF   ZERO
0024  REF   2 LAST  98    13,3521  56 045 0           XCH   INLINK
0025  REF   2 LAST  61    13,3522  54 073 1           TS    KEYTEMP1
0026  REF  10 LAST 201    13,3523  3 7761 0           CAF   BIT3          TURN ON UPACT LIGHT
0027                       13,3524  0 0006 1           EXTEND              (BIT 3 OF CHANNEL 11)
0028  REF   1              13,3525  05 011 1           WOR   DSALMOUT
0029  REF   2 LAST 228    13,3526  3 4556 0  JPRPT1   CAF   LOW5          TEST FOR TRIPLE CHAR REDUNDANCY
0030  REF   3 LAST 229    13,3527  7 0073 1           MASK  KEYTEMP1      LOW5 OF WORD
0031  REF   4 LAST 229    13,3530  56 073 0           XCH   KEYTEMP1      LOW5 INTO KEYTEMP1
0032  REF   3 LAST  73    13,3531  56 021 1           XCH   SR            WHOLE WORD INTO SR
0033  REF   1              13,3532  55'076 0           TS    KEYTEMP2      ORIGINAL SR INTO KEYTEMP2
0034  REF   1              13,3533  0 3577 1           TC    SRGHT5
0035  REF   3 LAST 229    13,3534  7 4556 1           MASK  LOW5          MID 5
0036  REF   1              13,3535  6 3611 1           AD    HI10
0037  REF   1              13,3536  0 3606 1           TC    JPTEST
0038  REF   2 LAST 229    13,3537  0 3577 1           TC    SRGHT5
0039  REF   4 LAST 229    13,3540  7 4556 1           MASK  LOW5          HIGH 5
0040                       13,3541  4 0000 0           COM
0041  REF   2 LAST 229    13,3542  0 3606 1           TC    JPTEST
0042  REF   1              13,3543  0 3573 0  JPOK     TC    RESTORSR      CODE IS GOOD
0043  REF   1              13,3544  4 3550 0           CS    ELRCODE       IF CODE = ERROR LIGHT RESET, PJT +0
0044  REF   5 LAST 229    13,3545  6 0073 0           AD    KEYTEMP1      INTO BIT1 OF UPLOCK.
0045  REF 132 LAST 220    13,3546  10 000 0           CCS   A             IF CODE NOT= ELR, PASS CODE ONLY IF
0046  REF   1              13,3547  0 3556 1           TC    TSTJPLOK      BIT1 OF UPLOCK = 0.
0047                       13,3550   00022 1  ELRCODE  OCT   22
0048  REF   2 LAST 229    13,3551  0 3556 1           TC    TSTJPLOK
0049  REF  11 LAST 229    13,3552  4 7761 1           CS    BIT3
0050  REF   3 LAST  94    13,3553  7 0075 1           MASK  FLAGWRD1
0051  REF   4 LAST 229    13,3554  54 075 1           TS    FLAGWRD1
0052  REF   1              13,3555  0 3562 0           TC    ACCEPTUP
0053  REF  12 LAST 229    13,3556  3 7761 0  TSTUPLOK CAF   BIT3
0054  REF   5 LAST 229    13,3557  7 0075 1           MASK  FLAGWRD1
0055  REF 133 LAST 229    13,3560  10 000 0           CCS   A
0056  REF  14 LAST 228    13,3561  0 5733 0           TC    RESJME        BIT1 OF UPLOCK = 1.
0057  REF   6 LAST 229    13,3562  56 073 0  ACCEPTJP XCH   KEYTEMP1     BIT1 OF UPLOCK = 0.
0058  REF   1              13,3563  0 3503 1           TC    KEYCOM

0059  REF   2 LAST 229    13,3564  0 3573 0  TMFAIL2  TC    RESTORSR      CODE IS BAD
0060  REF  13 LAST 229    13,3565  4 7761 1           CS    BIT3
0061  REF   6 LAST 229    13,3566  7 0075 1           MASK  FLAGWRD1
0062  REF  14 LAST 229    13,3567  6 7761 0           AD    BIT3
0063  REF   7 LAST 229    13,3570  54 075 1           TS    FLAGWRD1
0064  REF   1              13,3571  0 5733 0  TMFAIL1  TC    TMALM
0065  REF  15 LAST 229    13,3572  0 5733 0           TC    RESJME
```

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```
0066  REF   2 LAST 229    13,3573  57,076 1  RESTORSR XCH    KEYTEMP2
0067                      13,3574  6 0000 1          DOUBLE
0068  REF   4 LAST 229    13,3575  54 021 0          TS      SR
0069  REF  58 LAST 229    13,3576  0 0002 0          TC      Q

0070  REF  16 LAST 229                5733  TMALM     =       RESJME      FOR NOW

0071  REF   5 LAST 230    13,3577  4 0021 0  SRGHT5  CS      SR
0072  REF   6 LAST 230    13,3600  4 0021 0          CS      SR
0073  REF   7 LAST 230    13,3601  4 0021 0          CS      SR
0074  REF   8 LAST 230    13,3602  4 0021 0          CS      SR
0075  REF   9 LAST 230    13,3603  4 0021 0          CS      SR
0076  REF 134 LAST 229    13,3604  4 0000 0          CS      A
0077  REF  59 LAST 230    13,3605  0 0002 0          TC      Q           DELIVERS WORD UNCOMPLEMENTED

0078  REF   7 LAST 229    13,3606  6 0073 0  UPTEST  AD      KEYTEMP1
0079  REF 135 LAST 230    13,3607  10 000 0          CCS     A
0080  REF   1             13,3610  0 3564 0          TC      TMFAIL2
0081                      13,3611   77740 1  HI10    OCT     77740
0082  REF   2 LAST 230    13,3612  0 3564 0          TC      TMFAIL2
0083  REF  70 LAST 230    13,3613  0 0002 0          TC      Q
```

R0084 UPACT IS TURNED OFF BY VBRELDSP, ALSO BY ERROR LIGHT RESET.

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R0085 THE RECEPTION OF A BAD CODE BY UPLINK LOCKS OUT FURTHER UPLINK ACTIVITY
R0086 BY PLACING A 1 INTO BIT1 OF UPLOCK. BIT9 (ALONG WITH BIT11) OF TMKEYBUF
R0087 IS SET TO 1 TO SEND AN INDICATION OF THIS SITUATION DOWN THE DOWNLINK.
R0088 THE UPLINK INTERLOCK IS ALLOWED WHEN AN ERROR LIGHT RESET CODE IS SENT
R0089 UP THE UPLINK, OR WHEN A FRESH START IS PERFORMED.

L PINBALL GAME BUTTONS AND LIGHTS USER'S OWN PAGE NO. 1 53

R0001 PROGRAM NAME - KEYBOARD AND DISPLAY PROGRAM DATE - 22 NOV 1966
R0003 MOD NO - 0 LOG SECTION - PINBALL GAME
R0005 MOD BY - FILENE BUTTONS AND LIGHTS
R0007 ASSEMBLY - SUNBURST REV 18

R0009 FUNCTIONAL DESCRIPTION-

R0010 THE KEYBOARD AND DISPLAY SYSTEM PROGRAM OPERATES UNDER EXECUTIVE
R0011 CONTROL AND PROCESSES INFORMATION EXCHANGED BETWEEN THE AGC AND THE
R0012 COMPUTER OPERATOR. THE INPUTS TO THE PROGRAM ARE FROM THE KEYBOARD,
R0013 FROM INTERNAL PROGRAMS, AND FROM THE UPLINK.
R0014 THE LANGUAGE OF COMMUNICATION WITH THE PROGRAM IS A PAIR OF WORDS
R0015 KNOWN AS VERB AND NOUN. EACH OF THESE IS REPRESENTED BY A 2 CHARACTER
R0016 OCTAL NUMBER. THE VERB CODE INDICATES WHAT ACTION IS TO BE TAKEN.
R0017 NOUN CODE INDICATES TO WHAT THIS ACTION IS APPLIED. NOUNS USUALLY
R0018 REFER TO A GROUP OF ERASABLE REGISTERS.
R0019
R0020 VERBS ARE GROUPED INTO DISPLAYS, LOADS, MONITORS (DISPLAYS THAT ARE
R0021 UPDATED ONCE PER SECOND), SPECIAL FUNCTIONS, AND EXTENDED VERBS(THESE
R0022 ARE OUTSIDE OF THE DOMAIN OF PINBALL AND CAN BE FOUND UNDER LOG SECTION
R0023 :EXTENDED VERBS:).
R0024 A LIST OF VERBS AND NOUNS IS GIVEN IN LOG SECTION :ASSEMBLY AND
R0025 OPERATION INFORMATION:.

R0026 CALLING SEQUENCES-

R0027 KEYBOARD:
R0028 EACH DEPRESSION OF A KEYBOARD BUTTON ACTIVATES INTERRUPT KEYRUPT1
R0029 AND PLACES THE 5 BIT KEY CODE INTO CHANNEL 15. KEYRUPT1 PLACES THE KEY
R0030 CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE KEYBOARD AND DISPLAY
R0031 PROGRAM (AT :CHARIN:), AND EXECUTES A RESUME.

R0032 UPLINK:
R0033 EACH WORD RECEIVED BY THE UPLINK ACTIVATES INTERRUPT UPRUPT WHICH
R0034 PLACES THE 5 BIT KEY CODE INTO MPAC, ENTERS AN EXECUTIVE REQUEST FOR THE
R0035 KEYBOARD AND DISPLAY PROGRAM (AT:CHARIN:) AND EXECUTES A RESUME.

R0036 INTERNAL PROGRAMS:
R0037 INTERNAL PROGRAMS CALL PINBALL AT :NVSUB: WITH THE DESIRED VERB/NOUN
R0038 CODE IN A (LOW 6 BITS FOR NOUN, NEXT 6 BITS FOR VERB). DETAILS
R0039 DESCRIBED ON REMARKS CARDS JUST BEFORE :NVSUB: AND :NVSUBWAIT: (SEE
R0040 SYMBOL TABLE FOR PAGE NUMBERS).
R0041 THERE IS AN INTERLOCK SYSTEM FOR INTERNAL PROGRAMS THAT MUST BE USED
R0042 IN CONJUNCTION WITH :NVSUB:. THIS IS CALLED GRAB/FREE. DETAILS
R0043 DESCRIBED ON REMARKS JUST BEFORE :GRABDSP:, :GRABWAIT: (SEE SYMBOL TABLE
R0044 FOR PAGE NUMBERS).

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R0045 NORMAL EXIT MODES-

R0046 IF PINBALL WAS CALLED BY EXTERNAL ACTION, EXIT IS TO :ENDOFJOB:.

R0047 IF PINBALL WAS CALLED BY INTERNAL PROGRAMS, EXIT FROM PINBALL IS BACK
R0048 TO CALLING ROUTINE. DETAILS DESCRIBED IN REMARKS CARDS JUST BEFORE
R0049 :NVSUB: AND :NVSUBWAIT: (SEE SYMBOL TABLE FOR PAGE NUMBERS).

R0050 ALARM OR ABORT EXIT MODES-

R0051 EXTERNAL INITIATION:
R0052 IF SOME IMPROPER SEQUENCE OF KEY CODES IS DETECTED, THE OPERATOR
R0053 ERROR LIGHT IS TURNED ON AND EXIT IS TO :ENDOFJOB:.

R0054 INTERNAL PROGRAM INITIATION:
R0055 IF AN ILLEGAL V/N COMBINATION IS ATTEMPTED, AN ABORT IS CAUSED
R0056 (WITH OCTAL 01501) AND EXIT TO :ENDOFJOB:.

R0057 CONDITIONS LEADING TO THE ABOVE ARE DESCRIBED IN DIGITAL DEVELOPMENT
R0058 REPORT NO. 11.

R0059 OUTPUT-

R0060 INFORMATION TO BE SENT TO THE DISPLAY PANEL IS LEFT IN THE :DSPTAB:
R0061 BUFFERS REGISTERS (UNDER EXEC CONTROL). :DSPOUT: (A PART OF T4RUPT)
R0062 HANDLES THE PLACING OF THE :DSPTAB: INFORMATION INTO OUTPUT CHANNEL 10
R0063 IN INTERRUPT.

R0064 ERASABLE INITIALIZATION-

R0065 FRESH START AND RESTART INITIALIZE THE NECESSARY E REGISTERS FOR
R0066 PINBALL IN :STARTSUB:. REGISTERS ARE: DSPTAB BUFFER, CADRSTOR,
R0067 REQRET, CLPASS, DSPLOCK, MONSAVE, MONSAVE1, GRABLOCK, VERBREG, NOUNREG,
R0068 DSPLIST, +1, +2, DSPCOUNT.

R0069 A COMPLETE LIST OF ALL THE ERASABLES (BOTH RESERVED AND TEMPORARIES) FOR
R0070 PINBALL IS GIVEN BELOW.

R0071 THE FOLLOWING ARE OF GENERAL INTEREST-

R0072 REMARKS CARDS PRECEDE THE REFERENCED SYMBOL DEFINITION. SEE SYMBOL
R0073 TABLE TO FIND APPROPRIATE PAGE NUMBERS.

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R0074 NVSUB CALLING POINT FOR INTERNAL USE OF PINBALL.
R0075 OF RELATED INTEREST NVSUBWAIT
R0076 NVSUBSY
R0077 PRENVBSY

R0078 GRABDSP INTERLOCK SYSTEM FOR INTERNAL PROGRAMS THAT MUST BE USED
R0079 FREEDSP IN CONJUNCTION WITH :NVSUB:.
R0080 OF RELATED INTEREST GRABWAIT
R0081 GRABJSY
R0082 PREGBSY

R0083 ENDIDLE ROUTINE FOR INTERNAL PROGRAMS WISHING TO GO TO SLEEP WHILE
R0084 AWAITING OPERATORS RESPONSE.
R0085 OF RELATED INTEREST DATAWAIT

R0086 MONITOR VERBS FOR PERIODIC (1 PER SEC) DISPLAY.

R0087 THE NOUN TABLE FORMAT IS DESCRIBED ON A PAGE OF REMARKS CARDS JUST
R0088 BEFORE :DSPABC: (SEE SYMBOL TABLE FOR PAGE NUMBER).

R0089 THE NOUN TABLES THEMSELVES ARE FOUND ON 7 PAGES STARTING AT :NNADTAB:

R0090 FOR FURTHER DETAILS ABOUT OPERATION OF THE KEYBOARD AND DISPLAY SYSTEM
R0091 PROGRAM, SEE THE MISSION PLAN AND/OR DIGITAL DEVELOPMENT REPORT NO. 11.

L PINBALL GAME BUTTONS AND LIGHTS USER'S OWN PAGE NO. 4 S3

R0150 KEYBOARD AND DISPLAY PROGRAM

R0151 THE FOLLOWING QUOTATION IS PROVIDED THROUGH THE COUTESY OF THE AUTHORS.

R0152 ::IT WILL BE PROVED TO THY FACE THAT THOU HAST MEN ABOUT THEE THAT
R0153 USUALLY TALK OF A NOUN AND A VERB, AND SUCH ABOMINABLE WORDS AS NO
R0154 CHRISTIAN EAR CAN ENDURE TO HEAR.;;

R0155 HENRY 6, ACT 2, SCENE 4

R0156 THE FOLLOWING ASSIGNMENTS FOR PINBALL ARE MADE ELSEWHERE

R0157 RESERVED FOR PINBALL EXECUTIVE ACTION

R0158	DSPCOUNT	ERASE		DISPLAY POSITION INDICATOR
R0159	DECBRNCH	ERASE		+DEC, -DEC, OCT INDICATOR
R0160	VERBREG	ERASE		VERB CODE
R0161	NOUNREG	ERASE		NOUN CODE
R0162	XREG	ERASE		R1 INPUT BUFFER
R0163	YREG	ERASE		R2 INPUT BUFFER
R0164	ZREG	ERASE		R3 INPUT BUFFER
R0165	XREGLP	ERASE		LO PART OF XREG (FOR DEC CONV ONLY)
R0166	YREGLP	ERASE		LO PART OF YREG (FOR DEC CONV ONLY)
R0167	ZREGLP	ERASE		LO PART OF ZREG (FOR DEC CONV ONLY)
R0168	MODREG	ERASE		MODE CODE
R0169	DSPLOCK	ERASE		KEYBOARD/SUBROUTINE CALL INTERLOCK
R0170	REQRET	ERASE		RETURN REGISTER FOR LOAD
R0171	LOADSTAT	ERASE		STATUS INDICATOR FOR LOADTST
R0172	CLPASS	ERASE		PASS INDICATOR CLEAR
R0173	NOUT	ERASE		ACTIVITY COUNTER FOR DSPTAB
R0174	NOUNCADR	ERASE		MACHINE CADR FOR NOUN
R0175	MONSAVE	ERASE		N/V CODE FOR MONITOR, (= MONSAVE1-1)
R0176	MONSAVE1	ERASE		NOUNCADR FOR MONITOR(MATBS) =MONSAVE +1
R0177	DSPTAB	ERASE	+13D	0-10,DISPLAY PANEL BUFFER,11-13,C RELAYS
R0178	CADRSTOR	ERASE		ENDIDLE STORAGE
R0179	GRABLOCK	ERASE		INTERNAL INTERLOCK FOR DISPLAY SYSTEM
R0180	NVQTEM	ERASE		NVSUB STORAGE FOR CALLING ADDRESS
R0181				MUST = NVBNKTEM-1
R0182	NVBNKTEM	ERASE		NVSUB STORAGE FOR CALLING BANK
R0183				MUST = NVQTEM+1
R0184	DSPLIST	ERASE	+2	WAITING LIST FOR DSP SYST INTERNAL USE
R0185	EXTVBACT	REASE		EXTENDED VERB ACTIVITY INTERLOCK
R0186	DSPTEM1	ERASE	+2	BUFFER STORAGE AREA 1 (MOSTLY FOR TIME)
R0187	DSPTEM2	ERASE	+2	BUFFER STORAGE AREA 2 (MOSTLY FOR DEC)

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```
R0188   END OF ERASABLES RESERVED FOR PINBALL EXECUTIVE ACTION


R0189   TEMPORARIES FOR PINBALL EXECUTIVE ACTION

R0190   DSEXIT    =       INTB15+         RETURN FOR DSPIN
R0191   EXITEM    =       INTB15+         RETURN FOR SCALE FACTOR ROUTINE SELECT
R0192   BLANKRET  =       INTB15+         RETURN FOR 2BLANK

R0193   WRDRET    =       INTBIT15        RETURN FOR 5BLANK
R0194   WDRET     =       INTBIT15        RETURN FOR DSPWD
R0195   DECRET    =       INTBIT15        RETURN FOR PUTCOM(DEC LOAD)
R0196   21/22REG  =       INTBIT15        TEMP FOR CHARIN

R0197   UPDATRET  =       POLISH          RETURN FOR UPDATNN, UPDATVB
R0198   CHAR      =       POLISH          TEMP FOR CHARIN
R0199   ERCNT     =       POLISH          COUNTER FOR ERROR LIGHT RESET
R0200   DECOUNT   =       POLISH          COUNTER FOR SCALING AND DISPLAY (DEC)

R0201   SGNON     =       VBUF            TEMP FOR +,- ON
R0202   NOUNTEM   =       VBUF            COUNTER FOR MIXNOUN FETCH
R0203   DISTEM    =       VBUF            COUNTER FOR OCTAL DISPLAY VERBS
R0204   DECTEM    =       VBUF            COUNTER FOR FETCH (DEC DISPLAY VERBS)

R0205   SGNOFF    =       VBUF    +1      TEMP FOR +,- ON
R0206   NVTEMP    =       VBUF    +1      TEMP FOR NVSUB
R0207   SFTEMP1   =       VBUF    +1      STORAGE FOR SF CONST HI PART(=SFTEMP2-1)

R0208   CODE      =       VBUF    +2      FOR DSPIN
R0209   SFTEMP2   =       VBUF    +2      STORAGE FOR SF CONST LO PART(=SFTEMP1+1)

R0210   MIXTEMP   =       VBUF    +3      FOR MIXNOUN DATA
R0211   SIGNRET   =       VBUF    +3      RETURN FOR +,- ON

R0212   ALSO MIXTEMP+1 = VBUF+4, MIXTEMP+2 = VBUF+5.

R0213   ENTRET    =       DOTINC          EXIT FROM ENTER

R0214   WDCNT     =       DOTRET          CHAR COUNTER FOR DSPWD
R0215   INREL     =       DOTRET          INPUT BUFFER SELECTOR ( X,Y,Z, REG )

R0216   DSPMMTEM  =       MATINC          DSPCOUNT SAVE FOR DSPMM
R0217   MIXBR     =       MATINC          INDICATOR FOR MIXED OR NORMAL NOUN

R0218   TEM1      ERASE                   EXEC TEMP
R0219   DSREL     =       TEM1            REL ADDRESS FOR DSPIN

R0220   TEM2      ERASE                   EXEC TEMP
R0221   DSMAG     =       TEM2            MAGNITUDE STORE FOR DSPIN
```

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```
R0222   IDADDTEM =      TEM2            MIXNOUN INDIRECT ADDRESS STORAGE

R0223   TEM3     ERASE                  EXEC TEMP
R0224   COUNT    =      TEM3            FOR DSPIN

R0225   TEM4     ERASE                  EXEC TEMP
R0226   LSTPTR   =      TEM4            LIST POINTER FOR GRABJSY
R0227   RELRET   =      TEM4            RETURN FOR RELDSP
R0228   FREERET  =      TEM4            RETURN FOR FREEDSP

R0229   TEM5     ERASE                  EXEC TEMP
R0230   NOUNADD  =      TEM5            TEMP STORAGE FOR NOUN ADDRESS

R0231   NNADTEM  ERASE                  TEMP FOR NOUN ADDRESS TABLE ENTRY
R0232   NNTYPTEM ERASE                  TEMP FOR NOUN TYPE TABLE ENTRY
R0233   IDAD1TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0234                                   MUST = IDAD2TEM-1, = IDAD3TEM-2.
R0235   IDAD2TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0236                                   MUST = IDAD1TEM+1, = IDAD3TEM-1.
R0237   IDAD3TEM ERASE                  TEMP FOR INDIR ADRESS TABLE ENTRY(MIXNN)
R0238                                   MUST = IDAD1TEM+2, = IDAD2TEM+1.
R0239   RUTMXTEM ERASE                  TEMP FOR SF ROUT TABLE ENTRY(MIXNN ONLY)
R0240   END OF TEMPORARIES FOR PINBALL EXECUTIVE ACTION


R0241   RESERVED FOR PINBALL INTERRUPT ACTION

R0242   DSPCNT   ERASE                  COUNTER FOR DSPOUT
R0243   UPLOCK   ERASE                  BIT1 = UPLINK INTERLOCK (ACTIVATED BY
A0244                                                   RECEPTION OF A BAD MESSAGE IN UPLINK)
R0245   END OF ERASABLES RESERVED FOR PINBALL INTERRUPT ACTION


R0246   TEMPORARIES FOR PINBALL INTERRUPT ACTION

R0247   KEYTEMP1 =      WAITEXIT        TEMP FOR KEYRUPT, UPRUPT
R0248   DSRUPTEM =      WAITEXIT        TEMP FOR DSPOUT
R0249   KEYTEMP2 =      RUPTAGN         TEMP FOR KEYRUPT, UPRUPT
R0250   END OF TEMPORARIES FOR PINBALL INTERRUPT ACTION
```

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```
P0251   THE INPUT CODES ASSUMED FOR THE KEYBOARD ARE.
R0252   0          10000
R0253   1          00001
R0254   9          01001
R0255   VERB       10001
R0256   ERROR RES10010
R0257   KEY R SE 11001
R0258   +          11010
R0259   -          11011
R0260   ENTER      11100
R0261   CLEAR      11110
R0262   NOUN       11111


R0263   OUTPUT FORMAT FOR DISPLAY PANEL. SET OUT0 TO  AAAABCCCCCDDDDD.
R0264   A-5 SELECT A RELAYWORD. THIS DETERMINES WHICH PAIR OF CHARACTERS ARE
R0265   ENERGIZED.
R0266   B FOR SPECIAL RELAYS SUCH AS SIGNS ETC.
R0267   C-5  5 BIT RELAY CODE FOR LEFT CHAR OF PAIR SELECTED BY RELAYWORD
R0268   D-5  5 BIT RELAY CODE FOR RIGHTCHAR OF PAIR SELECTED BY RELAYWORD.

R0269   THE PANEL APPEARS AS FOLLOWS.
R0270   MD1     MD2                              (MAJOR MODE)
R0271   VD1     VD2 (VERB)      ND1     ND2      (NOUN)
R0272   R1D1    R1D2    R1D3    R1D4    R1D5     (R1)
R0273   R2D1    R2D2    R2D3    R2D4    R2D5     (R2)
R0274   R3D1    R3D2    R3D3    R3D4    R3D5     (R3)

R0275   EACH OF THESE IS GIVEN A DSPCOUNT NUMBER FOR USE WITHIN COMPUTATION ONLY
R0276   MD1   25      R2D1  11          ALL ARE OCTAL
R0277   MD2   24      R2D2  10
R0278   VD1   23      R2D3   7
R0279   VD2   22      R2D4   6
R0280   ND1   21      R2D5   5
R0281   ND2   20      R3D1   4
R0282   R1D1  16      R3D2   3
R0283   R1D2  15      R3D3   2
R0284   R1D3  14      R3D4   1
R0285   R1D4  13      R3D5   0
R0286   R1D5  12


R0287   THERE IS AN 11 REGISTER TABLE (DSPTAB) FOR THE DISPLAY PANEL.

R0288   DSPTAB RELAYWD       BIT11      BITS 10-6      BITS 5-1
R0289   RELAD
R0290   10     1011                     MD1  (25)      MD2  (24)
R0291   9      1010                     VD1  (23)      VD2  (22)
```

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R0292	8	1001		ND1 (21)	ND2 (20)	
R0293	7	1000			R1D1 (16)	
R0294	6	0111	+R1	R1D2 (15)	R1D3 (14)	
R0295	5	0110	-R1	R1D4 (13)	R1D5 (12)	
R0296	4	0101	+R2	R2D1 (11)	R2D2 (10)	
R0297	3	0100	-R2	R2D3 (7)	R2D4 (6)	
R0298	2	0011		R2D5 (5)	R3D1 (4)	
R0299	1	0010	+R3	R3D2 (3)	R3D3 (2)	
R0300	0	0001	-R3	R3D4 (1)	R3D5 (0)	
R0301		0000	NO RELAYWORD			

R0302 THE 5 BIT RELAY CODES ARE.

R0303	BLANK	00000
R0304	0	10101
R0305	1	00011
R0306	2	11001
R0307	3	11011
R0308	4	01111
R0309	5	11110
R0310	6	11100
R0311	7	10011
R0312	8	11101
R0313	9	11111

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P0314 START OF EXECUTIVE SECTION OF PINBALL

```
0315                                    04,2000         SETLOC 20000

0316  REF    1                 04,2000  0 3472 0  GRABUSYB  TC    GRABUSY1      STANDARD LEAD INS. DONT MOVE.
0317  REF    1                 04,2001  0 3514 1  NVSUBSYB  TC    NVSUBSY1

0318  REF   36 LAST 221        04,2002  3 7763 1  CHARIN    CAF   ONE           BLOCK DISPLAY SYST
0319  REF    2 LAST  98        04,2003  56 303 1            XCH   DSPLOCK       MAKE DSP SYST BUSY, BUT SAVE OLD
0320  REF    1                 04,2004  54 105 1            TS    21/22REG      C(DSPLOCK) FOR ERROR LIGHT RESET.
0321  REF   77 LAST 228        04,2005  56 144 0            XCH   MPAC
0322  REF    1                 04,2006  54 107 0            TS    CHAR
0323  REF  136 LAST 230        04,2007  50 000 1            INDEX A
0324                            04,2010  0 2011 0            TC    +1            INPUT CODE      FUNCTION
0325  REF    1                 04,2011  0 3313 0            TC    CHARALRM      0
0326  REF    1                 04,2012  0 2070 1            TC    NUM           1
0327  REF    2 LAST 240        04,2013  0 2070 1            TC    NUM           2
0328  REF    3 LAST 240        04,2014  0 2070 1            TC    NUM           3
0329  REF    4 LAST 240        04,2015  0 2070 1            TC    NUM           4
0330  REF    5 LAST 240        04,2016  0 2070 1            TC    NUM           5
0331  REF    6 LAST 240        04,2017  0 2070 1            TC    NUM           6
0332  REF    7 LAST 240        04,2020  0 2070 1            TC    NUM           7
0333  REF    1                 04,2021  0 2061 1            TC    B9TEST        10              8
0334  REF    2 LAST 240        04,2022  0 2061 1            TC    B9TEST        11              9
0335  REF    2 LAST 240        04,2023  0 3313 0            TC    CHARALRM      12
0336  REF    3 LAST 240        04,2024  0 3313 0            TC    CHARALRM      13
0337  REF    4 LAST 240        04,2025  0 3313 0            TC    CHARALRM      14
0338  REF    5 LAST 240        04,2026  0 3313 0            TC    CHARALRM      15
0339  REF    6 LAST 240        04,2027  0 3313 0            TC    CHARALRM      16
0340  REF    7 LAST 240        04,2030  0 3313 0            TC    CHARALRM      17
0341  REF    8 LAST 240        04,2031  0 2066 0            TC    NUM     -2    20              0
0342  REF    1                 04,2032  0 2243 0            TC    VERB          21              VERB
0343  REF    1                 04,2033  0 2355 0            TC    ERROR         22              ERROR LIGHT RESET
0344  REF    1                 04,2034  0 2053 0            TC    ABRT23GO      23              SUBORBIT ABORT
0345  REF    1                 04,2035  0 2056 0            TC    ABRT24GO      24              CONORBIT ABORT
0346  REF    8 LAST 240        04,2036  0 3313 0            TC    CHARALRM      25
0347  REF    9 LAST 240        04,2037  0 3313 0            TC    CHARALRM      26
0348  REF   10 LAST 240        04,2040  0 3313 0            TC    CHARALRM      27
0349  REF   11 LAST 240        04,2041  0 3313 0            TC    CHARALRM      30
0350  REF    1                 04,2042  0 3336 1            TC    VBRELDSP      31              KEY RELEASE
0351  REF    1                 04,2043  0 2275 0            TC    POSSGN        32              +
0352  REF    1                 04,2044  0 2262 0            TC    NEGSGN        33              -
0353  REF    1                 04,2045  0 2051 1            TC    ENTERJMP      34              ENTER
0354  REF   12 LAST 240        04,2046  0 3313 0            TC    CHARALRM      35
0355  REF    1                 04,2047  0 2446 0            TC    CLEAR         36              CLEAR
0356  REF    1                 04,2050  0 2256 1            TC    NOUN          37              NOUN
```

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```
0357  REF  13 LAST 212    04,2051  0 5225 1  ENTERJMP TC    POSTJUMP
0358  REF   1             04,2052   12003 1            CADR  ENTER

0359  REF   1             04,2053  0 4666 0  ABRT23SO TC    RELDSP
0360  REF  14 LAST 241    04,2054  0 5225 1            TC    POSTJUMP
0361  REF   1             04,2055   56350 1            CADR  SUBABORT
0362  REF   2 LAST 241    04,2056  0 4666 0  ABRT24SO TC    RELDSP
0363  REF  15 LAST 241    04,2057  0 5225 1            TC    POSTJUMP
0364  REF   1             04,2060   56353 1            CADR  CONDRBIT

0365  REF   6 LAST 197    04,2061  3 6311 1  89TEST   CAF   THREE
0366  REF   1             04,2062  7 0271 1            MASK  DECBRNCH
0367  REF 137 LAST 240    04,2063  10 000 0            CCS   A
0368  REF   9 LAST 240    04,2064  0 2070 1            TC    NUM          IF DECBRNCH IS +, 8 OR 9 OK
0369  REF  13 LAST 240    04,2065  0 3313 0            TC    CHARALRM     IF DECBRNCH IS +0, REJECT 8 OR 9


R0370  NUM ASSEMBLES OCTAL 3 BITS AT A TIME. FOR DECIMAL IT CONVERTS INCOMING
R0371  WORD AS A FRACTION, KEEPING RESULTS TO DP.
R0372  OCTAL RESULTS ARE LEFT IN XREG, YREG, OR ZREG. HI PART OF DEC IN XREG,
R0373  YREG, ZREG. THE LOW PARTS IN XREGLP, YREGLP, OR ZREGLP)
R0374  DECBRNCH IS LEFT AT +0 FOR OCT, +1 FOR + DEC, +2 FOR - DEC.
R0375  IF DSPCOUNT WAS LEFT -, NO MORE DATA IS ACCEPTED.

0376  REF  54 LAST 229    04,2066  3 7767 0            CAF   ZERO
0377  REF   2 LAST 240    04,2067  54 107 0            TS    CHAR
0378  REF   3 LAST 228    04,2070  10 270 0  NUM      CCS   DSPCOUNT
0379                      04,2071  0 2075 1            TC    +4           +
0380                      04,2072  0 2075 1            TC    +3           +0
0381                      04,2073  0 2074 0            TC    +1           -BLOCK DATA IN IF DSPCOUNT IS -
0382  REF  26 LAST 226    04,2074  0 5567 0            TC    ENDOFJOB     -0
0383  REF   1             04,2075  0 2213 0            TC    GETINREL
0384  REF   2 LAST  98    04,2076  10 306 0            CCS   CLPASS       IF CLPASS IS + OR +0, MAKE IT +0.
0385  REF  55 LAST 241    04,2077  3 7767 0            CAF   ZERO
0386  REF   3 LAST 241    04,2100  54 306 0            TS    CLPASS
0387                      04,2101  0 2102 0            TC    +1
0388  REF   3 LAST 241    04,2102  50 107 1            INDEX CHAR
0389  REF   2 LAST 107    04,2103  3 4300 0            CAF   RELTAB
0390  REF   5 LAST 229    04,2104  7 4556 1            MASK  LOW5
0391  REF   1             04,2105  54 114 1            TS    CODE
0392  REF   4 LAST 241    04,2106  3 0270 1            CA    DSPCOUNT
0393  REF   1             04,2107  54 133 1            TS    COUNT
0394  REF   1             04,2110  0 3217 0            TC    DSPIN
0395  REF   7 LAST 241    04,2111  3 6311 1            CAF   THREE
0396  REF   2 LAST 241    04,2112  7 0271 1            MASK  DECBRNCH
0397  REF 138 LAST 241    04,2113  10 000 0            CCS   A            +0, OCTAL.  +1, + DEC.  +2, - DEC.
0398  REF   1             04,2114  0 2125 0            TC    DECTOBIN     +
0399  REF   1             04,2115  50 127 0            INDEX INREL        +0 OCTAL
0400  REF   2 LAST  98    04,2116  56 272 0            XCH   VERBREG
```

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```
0401  REF   1                  04,2117  54 022 0            TS      CYL
0402  REF   2 LAST 242         04,2120  4 0022 0            CS      CYL
0403  REF   3 LAST 242         04,2121  4 0022 0            CS      CYL
0404  REF   4 LAST 242         04,2122  56 022 1            XCH     CYL
0405  REF   4 LAST 241         04,2123  6 0107 1            AD      CHAR
0406  REF   1                  04,2124  0 2142 1            TC      ENDNMTST
0407  REF   2 LAST 241         04,2125  50 127 0  DECTOBIN   INDEX   INREL
0408  REF   3 LAST 241         04,2126  56 272 0            XCH     VERBREG
0409  REF  78 LAST 240         04,2127  54 144 1            TS      MPAC            SUM X 2EXP-14 IN MPAC
0410  REF  56 LAST 241         04,2130  3 7767 0            CAF     ZERO
0411  REF  79 LAST 242         04,2131  54 145 0            TS      MPAC    +1
0412  REF   2 LAST  97         04,2132  3 4570 1            CAF     TEN             10 X 2EXP-14
0413  REF   1                  04,2133  0 7357 1            TC      SHORTMP         10SUM X 2EXP-28 IN MPAC, MPAC+1
0414  REF  80 LAST 242         04,2134  56 145 1            XCH     MPAC    +1
0415  REF   5 LAST 242         04,2135  6 0107 1            AD      CHAR
0416  REF  81 LAST 242         04,2136  54 145 0            TS      MPAC    +1
0417  REF   2 LAST 242         04,2137  0 2142 1            TC      ENDNMTST        NO OF
0418  REF  82 LAST 242         04,2140  26 144 1            ADS     MPAC            OF MUST BE 5TH CHAR
0419  REF   1                  04,2141  0 2160 1            TC      DECEND
0420  REF   3 LAST 242         04,2142  50 127 0  ENDNMTST   INDEX   INREL
0421  REF   4 LAST 242         04,2143  54 272 1            TS      VERBREG
0422  REF   5 LAST 241         04,2144  4 0270 0            CS      DSPCOUNT
0423  REF   4 LAST 242         04,2145  50 127 0            INDEX   INREL
0424  REF   1                  04,2146  6 2204 0            AD      CRITCON
0425                           04,2147  0 0006 1            EXTEND
0426  REF   1                  04,2150  1 2152 1            BZF     ENDNUM          -0, DSPCOUNT = CRITCON
0427  REF   1                  04,2151  0 2201 0            TC      MORNUM          - , DSPCOUNT G/ CRITCON
0428  REF   8 LAST 241         04,2152  3 6311 1  ENDNUM    CAF     THREE
0429  REF   3 LAST 241         04,2153  7 0271 1            MASK    DECBRNCH
0430  REF 139 LAST 241         04,2154  10 000 0            CCS     A
0431  REF   2 LAST 242         04,2155  0 2160 1            TC      DECEND
0432  REF   6 LAST 242         04,2156  4 0270 0  ENDALL    CS      DSPCOUNT        BLOCK NUMIN BY PLACING DSPCOUNT
0433  REF   2 LAST 242         04,2157  0 2202 0            TC      MORNUM  +1      NEGATIVELY
0434  REF   1                  04,2160  0 7155 1  DECEND    TC      DMP             MULT SUM X 2EXP-28 IN MPAC, MPAC+1 BY
0435  REF   1                  04,2161   02211 1            ADRES   DECON           2EXP14/10EXP5. GIVES(SUM/10EXP5)X2EXP-14
0436  REF   9 LAST 242         04,2162  3 6311 1            CAF     THREE           IN MPAC, +1, +2.
0437  REF   4 LAST 242         04,2163  7 0271 1            MASK    DECBRNCH
0438  REF 140 LAST 242         04,2164  50 000 1            INDEX   A
0439                           04,2165  0 2165 1            TC      +0
0440  REF   1                  04,2166  0 2172 1            TC      +DECSGN
0441                           04,2167  0 0006 1            EXTEND                  - CASE
0442  REF  83 LAST 242         04,2170  4 0146 0            DCS     MPAC    +1
0443  REF  84 LAST 242         04,2171  52 146 0            DXCH    MPAC    +1
0444  REF  85 LAST 242         04,2172  56 146 1  +DECSGN   XCH     MPAC    +2
0445  REF   5 LAST 242         04,2173  50 127 0            INDEX   INREL
0446  REF   1                  04,2174  54 275 0            TS      XREGLP  -2
0447  REF  86 LAST 242         04,2175  56 145 1            XCH     MPAC    +1
0448  REF   6 LAST 242         04,2176  50 127 0            INDEX   INREL
0449  REF   5 LAST 242         04,2177  54 272 1            TS      VERBREG
0450  REF   1                  04,2200  0 2156 1            TC      ENDALL
```

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```
0451  REF   7 LAST 242     04,2201  10 270 0  MORNUM   CCS    DSPCOUNT        DECREMENT DSPCOUNT
0452  REF   8 LAST 243     04,2202  54 270 0            TS     DSPCOUNT
0453  REF  27 LAST 241     04,2203  0 5567 0            TC     ENDOFJOB

0454                       04,2204  00022 1   CRITCON   OCT    22              (DEC 18)
0455                       04,2205  00020 0             OCT    20              (DEC 16)
0456                       04,2206  00012 1             OCT    12              (DEC 10)
0457                       04,2207  00005 1             OCT    5
0458                       04,2210  00000 1             OCT    0

0459                       04,2211  05174 0   DECON     2DEC   E-5 B14        2EXP14/10EXP5 = .16384 DEC
C0459                      04,2212  13261 0

R0460  GETINREL GETS PROPER DATA REG REL ADDRESS FOR CURRENT C(DSPCOUNT) AND
R0461  PUTS IN INTO INREL. +0 VERBREG, 1 NOUNREG, 2 XREG, 3 YREG, 4 ZREG.

0462  REF   9 LAST 243     04,2213  50 270 1  GETINREL INDEX  DSPCOUNT
0463  REF   1              04,2214  3 2217 1            CAF    INRELTAB
0464  REF   7 LAST 242     04,2215  54 127 1            TS     INREL           (A TEMP, REG)
0465  REF  71 LAST 230     04,2216  0 0002 0            TC     Q

0466                       04,2217  00004 0   INRELTAB  OCT    4               R3D5 (DSPCOUNT = 0)
0467                       04,2220  00004 0             OCT    4               R3D4          =(1)
0468                       04,2221  00004 0             OCT    4               R3D3          =(2)
0469                       04,2222  00004 0             OCT    4               R3D2          =(3)
0470                       04,2223  00004 0             OCT    4               R3D1          =(4)
0471                       04,2224  00003 1             OCT    3               R2D5          =(5)
0472                       04,2225  00003 1             OCT    3               R2D4          =(6)
0473                       04,2226  00003 1             OCT    3               R2D3          =(7)
0474                       04,2227  00003 1             OCT    3               R2D2          =(8D)
0475                       04,2230  00003 1             OCT    3               R2D1          =(9D)
0476                       04,2231  00002 0             OCT    2               R1D5          =(10D)
0477                       04,2232  00002 0             OCT    2               R1D4          =(11D)
0478                       04,2233  00002 0             OCT    2               R1D3          =(12D)
0479                       04,2234  00002 0             OCT    2               R1D2          =(13D)
0480                       04,2235  00002 0             OCT    2               R1D1          =(14D)
0481  REF   1              04,2236  0 4736 1            TC     CCSHOLE         NO DSPCOUNT NUMBER = 15D
0482                       04,2237  00001 0             OCT    1               ND2           =(16D)
0483                       04,2240  00001 0             OCT    1               ND1           =(17D)
0484                       04,2241  00000 1             OCT    0               VD2           =(18D)
0485                       04,2242  00000 1             OCT    0               VD1           =(19D)

0486  REF  57 LAST 242     04,2243  3 7767 0  VERB      CAF    ZERO
0487  REF   6 LAST 242     04,2244  54 272 1            TS     VERBREG
0488  REF   2 LAST  98     04,2245  3 4565 0            CAF    VD1
0489  REF  10 LAST 243     04,2246  54 270 0  NVCOM     TS     DSPCOUNT
0490  REF   1              04,2247  0 2557 1            TC     2BLANK
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```
0491  REF  58 LAST 243   04,2250  3 7767 0          CAF   ZERO
0492  REF   5 LAST 242   04,2251  54 271 1          TS    DECBRNCH
0493  REF   2 LAST  98   04,2252  54 304 1          TS    REQRET        SET FOR ENTPASO
0494  REF   1            04,2253  3 4505 0          CAF   ENDINST       IF DSPALARM OCCURS BEFORE FIRST ENTPASO
0495  REF   1            04,2254  54 126 0          TS    ENTRET        OR NVSUB, ENTRET MUST ALREADY BE SET
A0496                                                                   TO TC ENDOFJOB
0497  REF  28 LAST 243   04,2255  0 5567 0          TC    ENDOFJOB
0498  REF  59 LAST 244   04,2256  3 7767 0  NOUN    CAF   ZERO
0499  REF   3 LAST 201   04,2257  54 273 0          TS    NOUNREG
0500  REF   1            04,2260  3 4566 0          CAF   ND1           ND1, OCT 21 (DEC 17)
0501  REF   1            04,2261  0 2246 0          TC    NVCOM


0502  REF   1            04,2262  0 2334 1  NEGSGN  TC    SIGNTEST
0503  REF   1            04,2263  0 2321 0          TC    -ON
0504  REF  20 LAST 217   04,2264  3 7762 0          CAF   TWO
0505  REF   8 LAST 243   04,2265  50 127 0  BOTHSGN  INDEX INREL         SET DEC COMP BIT TO 1 (IN DECBRNCH)
0506  REF  15 LAST 197   04,2266  6 7755 1          AD    BIT7          BIT 5 FOR R1,  BIT 4 FOR R2,
0507  REF   6 LAST 244   04,2267  26 271 1          ADS   DECBRNCH      BIT 3 FOR R3.
0508  REF   4 LAST 241   04,2270  10 306 0  FIXCLPAS CCS   CLPASS       IF CLPASS IS + OR +0, MAKE IT +0.
0509  REF  50 LAST 244   04,2271  3 7767 0          CAF   ZERO
0510  REF   5 LAST 244   04,2272  54 306 0          TS    CLPASS
0511                     04,2273  0 2274 1          TC    +1
0512  REF  29 LAST 244   04,2274  0 5567 0          TC    ENDOFJOB

0513  REF   2 LAST 244   04,2275  0 2334 1  POSGN   TC    SIGNTEST
0514  REF   1            04,2276  0 2301 1          TC    +ON
0515  REF  37 LAST 240   04,2277  3 7763 1          CAF   ONE
0516  REF   1            04,2300  0 2265 1          TC    BOTHSGN

0517  REF  72 LAST 243   04,2301  22 002 0  +ON     EXCH  Q
0518  REF   2 LAST 241   04,2302  0 2213 0          TC    GETINREL
0519  REF   9 LAST 244   04,2303  50 127 0          INDEX INREL
0520  REF   1            04,2304  3 2327 0          CAF   SGNTAB  -2
0521  REF   1            04,2305  54 113 0          TS    SGNOFF
0522  REF  38 LAST 244   04,2306  6 7763 1          AD    ONE
0523  REF   1            04,2307  54 112 1          TS    SGNON
0524  REF  51 LAST 244   04,2310  3 7767 0  SGNCOM  CAF   ZERO
0525  REF   2 LAST 241   04,2311  54 114 1          TS    CODE
0526  REF   2 LAST 244   04,2312  56 113 1          XCH   SGNOFF
0527  REF   1            04,2313  0 3301 0          TC    11DSPIN
0528  REF  17 LAST 226   04,2314  3 7751 0          CAF   BIT11
0529  REF   3 LAST 244   04,2315  54 114 1          TS    CODE
0530  REF   2 LAST 244   04,2316  56 112 0          XCH   SGNON
0531  REF   2 LAST 244   04,2317  0 3301 0          TC    11DSPIN
0532  REF  48 LAST 217   04,2320  0 0001 0          TC    L
0533  REF  73 LAST 244   04,2321  22 002 0  -ON     EXCH  Q
0534  REF   3 LAST 244   04,2322  0 2213 0          TC    GETINREL
0535  REF  10 LAST 244   04,2323  50 127 0          INDEX INREL
```

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```
0536  REF   2 LAST 244   04,2324  3 2327 0          CAF   SGNTAB  -2
0537  REF   3 LAST 244   04,2325  54 112 1          TS    SGNON
0538  REF  39 LAST 244   04,2326  6 7763 1          AD    ONE
0539  REF   3 LAST 244   04,2327  54 113 0          TS    SGNOFF
0540  REF   1            04,2330  0 2310 1          TC    SGNCOM

0541                     04,2331   00005 1 SGNTAB   OCT   5          -R1
0542                     04,2332   00003 1          OCT   3          -R2
0543                     04,2333   00000 1          OCT   0          -R3


0544  REF  74 LAST 244   04,2334  22 002 0 SIGNTEST LXCH  Q          ALLOWS +,- ONLY WHEN DSPCOUNT=R1D1,
0545  REF  10 LAST 242   04,2335  3 6311 1          CAF   THREE      R2D1, OR R3D1. ALLOWS ONLY FIRST OF
0546  REF   7 LAST 244   04,2336  7 0271 1          MASK  DECBRNCH   CONSEQUTIVE +/- CHARACTERS.
0547  REF 141 LAST 242   04,2337  10 000 0          CCS   A          IF LOW 2 BITS OF DECBRNCH NOT = 0, SIGN
0548  REF  30 LAST 244   04,2340  0 5567 0          TC    ENDOFJOB   FOR THIS WORD ALREADY IN. REJECT.
0549  REF   1            04,2341  4 4527 1          CS    R1D1
0550  REF   1            04,2342  0 2350 0          TC    SGNTST1
0551  REF   1            04,2343  4 4530 1          CS    R2D1
0552  REF   2 LAST 245   04,2344  0 2350 0          TC    SGNTST1
0553  REF   1            04,2345  4 4531 0          CS    R3D1
0554  REF   3 LAST 245   04,2346  0 2350 0          TC    SGNTST1
0555  REF  31 LAST 245   04,2347  0 5567 0          TC    ENDOFJOB   NO MATCH FOUND. SIGN ILLEGAL
0556  REF  11 LAST 243   04,2350  6 0270 1 SGNTST1  AD    DSPCOUNT
0557                     04,2351  0 0006 1          EXTEND
0558                     04,2352  1 2354 0          BZF   +2         MATCH FOUND
0559  REF  75 LAST 245   04,2353  0 0002 0          TC    Q
0560  REF  49 LAST 244   04,2354  0 0001 0          TC    L          SIGN LEGAL


R0561  ERROR LIGHT RESET (RSET) TURNS OFF,
R0562  UPLINK ACTIVITY, AUTO, HOLD, FREE, NO ATT, OPERATOR ERROR,
R0563  PROG ALM, TRACKER FAIL.
R0564  LEAVES GIMBAL LOCK ALONE.
R0565  IT ALSO ZEROES THE :TEST ALARM; OUT BIT, WHICH TURNS OFF ST3V,RESTART.
R0566  IT ALSO SETS :CAUTION RESET: TO 1.
R0567  IT ALSO FORCES BIT 12 OF ALL DSPTAB ENTRIES TO 1.

0568  REF   2 LAST 240   04,2355  56 105 0 ERROR    XCH   21/22REG   RESTORE ORIGINAL C(DSPLOCK). THUS ERROR
0569  REF   3 LAST 240   04,2356  54 303 0          TS    DSPLOCK    LIGHT RESET LEAVES DSPLOCK UNCHANGED.
0570                     04,2357  0 0004 0          INHINT
0571  REF  24 LAST 223   04,2360  3 7752 0          CAF   BIT10      TURN ON :CAUTION RESET: OUTBIT
0572                     04,2361  0 0006 1          EXTEND
0573  REF   2 LAST 229   04,2362  05 011 1          WOR   DSALMOUT   BIT10 CHAN 11
0574  REF   1            04,2363  3 2444 1          CAF   GL+NOATT   LEAVE GIMBAL LOCK AND NO ATT INTACT,
0575  REF  25 LAST 170   04,2364  7 0326 1          MASK  DSPTAB +11D TURNING OFF AUTO, HOLD, FREE,
0576  REF  16 LAST 220   04,2365  6 7745 0          AD    BIT15      PROG ALARM, AND TRACKER.
0577  REF  26 LAST 245   04,2366  54 326 1          TS    DSPTAB +11D
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```
0578   REF   2 LAST 131      04,2367  4 5642 0          CS    PRIO16      RESET FAIL BITS WHICH GENERATE PROG
0579   REF  11 LAST 170      04,2370  7 0366 0          MASK  IMODES33    ALARM SO THAT IF THE FAILURE STILL
0580   REF   3 LAST 246      04,2371  6 5642 1          AD    PRIO16      EXISTS, THE ALARM WILL COME BACK.
0581   REF  12 LAST 246      04,2372  54 366 0          TS    IMODES33
0582   REF  25 LAST 245      04,2373  4 7752 1          CS    BIT10
0583   REF  55 LAST 224      04,2374  7 0365 0          MASK  IMODES30
0584   REF  26 LAST 246      04,2375  6 7752 0          AD    BIT10
0585   REF  56 LAST 246      04,2376  54 365 0          TS    IMODES30

0586   REF   1               04,2377  4 2443 1          CS    RFAILS
0587   REF  72 LAST 220      04,2400  7 0412 1          MASK  RADMODES
0588   REF  16 LAST 244      04,2401  6 7755 1          AD    BIT7
0589   REF  73 LAST 246      04,2402  54 412 1          TS    RADMODES

0590   REF  27 LAST 246      04,2403  4 7752 1          CS    BIT10       TURN OFF :TEST ALARM: OUTBIT.
0591                         04,2404  0 0006 1          EXTEND
0592   REF   1               04,2405  03 013 0          WAND  CHAN13
0593   REF   1               04,2406  4 2442 0          CS    ERCON       TURN OFF UPLINK ACTIVITY,
0594                         04,2407  0 0006 1          EXTEND            OPERATOR ERROR.
0595   REF   3 LAST 245      04,2410  03 011 1          WAND  DSALMOUT
0596   REF   1               04,2411  3 4570 1  TSTAB   CAF   BINCON     (DEC 10)
0597   REF   1               04,2412  54 107 0          TS    ERCNT       ERCNT = COUNT
0598                         04,2413  0 0004 0          INHINT
0599   REF   2 LAST 246      04,2414  50 107 1          INDEX ERCNT
0600   REF  27 LAST 245      04,2415  10 313 1          CCS   DSPTAB
0601   REF  40 LAST 245      04,2416  6 7763 1          AD    ONE
0602   REF   1               04,2417  0 2424 1          TC    ERPLUS
0603   REF  41 LAST 246      04,2420  6 7763 1          AD    ONE
0604   REF 142 LAST 245      04,2421  4 0000 0  ERMINUS  CS    A
0605   REF   1               04,2422  7 2445 1          MASK  NOTBIT12
0606   REF   1               04,2423  0 2427 1          TC    ERCOM
0607   REF 143 LAST 246      04,2424  4 0000 0  ERPLUS   CS    A
0608   REF   2 LAST 246      04,2425  7 2445 1          MASK  NOTBIT12
0609   REF 144 LAST 246      04,2426  4 0000 0          CS    A           MIGHT WANT TO RESET CLPASS, DECBRNCH,
0610   REF   3 LAST 246      04,2427  50 107 1  ERCOM   INDEX ERCNT       ETC.
0611   REF  28 LAST 246      04,2430  54 313 1          TS    DSPTAB
0612                         04,2431  0 0003 1          RELINT
0613   REF   4 LAST 246      04,2432  10 107 0          CCS   ERCNT
0614   REF   1               04,2433  0 2412 1          TC    TSTAB  +1
0615   REF  62 LAST 244      04,2434  3 7767 0          CAF   ZERO
0616   REF   4 LAST  88      04,2435  55'360 1          TS    FAILREG
0617   REF   5 LAST 246      04,2436  55'361 0          TS    FAILREG +1
0618   REF   6 LAST 246      04,2437  55'362 0          TS    FAILREG +2
0619   REF   1               04,2440  55'357 0          TS    SFAIL
0620   REF  32 LAST 245      04,2441  0 5567 0          TC    ENDOFJOB

0621                         04,2442   00104 1  ERCON    OCT   104         CHAN 11 BITS 3,7.
A0622                                                                     UPLINK ACTIVITY, AND OPERATOR ERROR.
0623                         04,2443   00330 1  RFAILS   OCT   330         RADAR CDU AND DATA FAIL FLAGS.
0624                         04,2444   00050 1  GL+NOATT OCT   00050       NO ATT AND GIMBAL LOCK LAMPS
```

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0625                        04,2445   73777 1  NOTBIT12 OCT    73777



R0626   CLEAR BLANKS WHICH R1, R2, R3 IS CURRENT OR LAST TO BE DISPLAYED(PERTINE
R0627   NT XREG,YREG,ZREG IS CLEARED). SUCCESSIVE CLEARS TAKE CARE OF EACH RX
R0628   L/ RC UNTIL R1 IS DONE. THEN NO FURTHER ACTION

R0629   THE SINGLE COMPONENT LOAD VERBS ALLOW ONLY THE SINGLE RC THAT IS
R0630   APPROPRIATE TO BE CLEARED.

R0631   CLPASS    +0  PASS0, CAN BE BACKED UP
R0632             +NZ  HIPASS, CAN BE BACKED UP
R0633             -NZ  PASS0, CANNOT BE BACKED UP

 0634   REF  12 LAST 245     04,2446  10 270 0  CLEAR    CCS     DSPCOUNT
 0635   REF  42 LAST 246     04,2447  6 7763 1           AD      ONE
 0636                        04,2450  0 2452 0           TC      +2
 0637   REF  43 LAST 247     04,2451  6 7763 1           AD      ONE
 0638   REF 145 LAST 246     04,2452  50 000 1           INDEX   A               DO NOT CHANGE DSPCOUNT BECAUSE MAY LATER
 0639   REF   2 LAST 243     04,2453  3 2217 1           CAF     INREITAB        FAIL LEGALTST.
 0640   REF  11 LAST 244     04,2454  54 127 1           TS      INREI           MUST SET INREL, EVEN FOR HIPASS.
 0641   REF   6 LAST 244     04,2455  10 306 0           CCS     CLPASS
 0642   REF   1              04,2456  0 2464 0           TC      CLPASHI         +
 0643                        04,2457  0 2461 0           TC      +2              +0    IF CLPASS IS +0 OR -, IT IS PASS0
 0644                        04,2460  0 2461 0           TC      +1              -
 0645   REF  12 LAST 247     04,2461  3 0127 0           CA      INREI
 0646   REF   1              04,2462  0 2506 0           TC      LEGALTST
 0647   REF   1              04,2463  0 2501 1           TC      CLEAR1
 0648   REF  13 LAST 247     04,2464  10 127 1  CLPASHI  CCS     INREL
 0649   REF  14 LAST 247     04,2465  54 127 1           TS      INREI
 0650   REF   2 LAST 247     04,2466  0 2506 0           TC      LEGALTST
 0651   REF   1              04,2467  3 2555 0           CAF     DOUBLK +2       +3 TO - NUMBER, BACKS DATA REQUESTS.
 0652   REF   3 LAST 244     04,2470  26 304 1           ADS     REQRET
 0653   REF  15 LAST 247     04,2471  3 0127 0           CA      INREL
 0654   REF   1              04,2472  54 115 0           TS      MIXTEMP         TEMP STORAGE FOR INREL
 0655                        04,2473  0 0006 1           EXTEND
 0656   REF   7 LAST 243     04,2474  26 272 1           DIM     VERBREG         DECREMENT VERB AND RE-DISPLAY
 0657   REF  18 LAST 207     04,2475  0 5206 0           TC      BANKCALL
 0658   REF   1              04,2476   12315 0          CADR    GOPROVB
 0659   REF   2 LAST 247     04,2477  3 0115 1           CA      MIXTEMP
 0660   REF  16 LAST 247     04,2500  54 127 1           TS      INREI           RESTORE INREL
 0661   REF   1              04,2501  0 2504 1  CLEAR1   TC      CLR5
 0662   REF   7 LAST 247     04,2502  24 306 1           INCR    CLPASS          ONLY IF CLPASS IS + OR +0,
 0663   REF  33 LAST 246     04,2503  0 5567 0           TC      ENDOFJOB        SET FOR HIGHER PASS.
 0664   REF  76 LAST 245     04,2504  22 002 0  CLR5     LXCH    Q               USES 5BLANK  BUT AVOIDS ITS TC GETINREL
 0665   REF   1              04,2505  0 2516 1           TC      5BLANK  +2
 0666   REF   2 LAST  76     04,2506  6 5336 1  LEGALTST AD      NEG2
 0667   REF 146 LAST 247     04,2507  10 000 0           CCS     A
 0668   REF  77 LAST 247     04,2510  0 0002 0           TC      Q               LEGAL  INREL G/ 2
```

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```
0669  REF   2 LAST 243     04,2511  0 4736 1          TC     CCSHOLE
0670  REF  34 LAST 247     04,2512  0 5567 0          TC     ENDOFJOB        ILLEGAL   INREL= 0,1
0671  REF  78 LAST 247     04,2513  0 0002 0          TC     Q               LEGAL     INREL = 2


R0672  5BLANK, BLANKS 5 CHAR DISPLAY WORD IN R1, R2, OR R3. IT ALSO ZEROES XREG,
R0673  YREG, OR ZREG.PLACE ANY + DSPCOUNT NUMBER FOR PERTINENT RC INTO DSPCOUNT
R0674  DSPCOUNT IS LEFT SET TO LEFT MOST DSP NUMB FOR RC JUST BLANKED.

0675  REF  79 LAST 248     04,2514  22 002 0  5BLANK  LXCH   Q
0676  REF   4 LAST 244     04,2515  0 2213 0           TC     GETINREL
0677  REF  53 LAST 246     04,2516  3 7767 0           CAF    ZERO
0678  REF  17 LAST 247     04,2517  50 127 0          INDEX  INREL
0679  REF   8 LAST 247     04,2520  54 272 1          TS     VERBREG         ZERO X, Y, Z REG.
0680  REF  18 LAST 248     04,2521  50 127 0          INDEX  INREL
0681  REF   2 LAST 242     04,2522  54 275 0          TS     XREGLP  -2
0682  REF   4 LAST 244     04,2523  54 114 1          TS     CODE
0683  REF  19 LAST 248     04,2524  50 127 0          INDEX  INREL           ZERO PERTINENT DEC COMP BIT.
0684  REF  17 LAST 246     04,2525  4 7755 0           CS     BIT7            PROTECT OTHERS
0685  REF   8 LAST 245     04,2526  7 0271 1           MASK   DEC3BNCH
0686  REF   1              04,2527  7 2556 1           MASK   BRNCHCON        ZERO LOW 2 BITS.
0687  REF   9 LAST 248     04,2530  54 271 1          TS     DEC3RNCH
0688  REF  20 LAST 248     04,2531  50 127 0          INDEX  INREL
0689  REF   1              04,2532  3 2546 1           CAF    SINBLANK -2     BLANK ISOLATED CHAR SEPARATELY
0690  REF   2 LAST 241     04,2533  54 133 1          TS     COUNT
0691  REF   2 LAST 241     04,2534  0 3217 0           TC     DSPIN
0692  REF  21 LAST 248     04,2535  50 127 0  5BLANK1 INDEX  INREL
0693  REF   2 LAST 247     04,2536  3 2551 1           CAF    DOUBLK  -2
0694  REF  13 LAST 247     04,2537  54 270 0          TS     DSPCOUNT
0695  REF   2 LAST 243     04,2540  0 2557 1           TC     2BLANK
0696  REF  21 LAST 244     04,2541  4 7762 1           CS     TWO
0697  REF  14 LAST 248     04,2542  26 270 0          ADS    DSPCOUNT
0698  REF   3 LAST 248     04,2543  0 2557 1           TC     2BLANK
0699  REF  22 LAST 248     04,2544  50 127 0          INDEX  INREL
0700  REF   2 LAST 245     04,2545  3 4525 1           CAF    R1D1    -2
0701  REF  15 LAST 248     04,2546  54 270 0          TS     DSPCOUNT        SET DSPCOUNT TO LEFT MOST DSP NUMBER
0702  REF  50 LAST 245     04,2547  0 0001 0           TC     L               OF REG. JUST BLANKED

0703                       04,2550   00016 0  SINBLANK OCT    16              DEC 14
0704                       04,2551   00005 1           OCT    5
0705                       04,2552   00004 0           OCT    4
0706                       04,2553   00015 0  DOUBLK   OCT    15              DEC 13
0707                       04,2554   00011 1           OCT    11              DEC 9
0708                       04,2555   00003 1           OCT    3

0709                       04,2556   77774 0  BRNCHCON OCT    77774

R0710  2BLANK, BLANKS TWO CHAR. PLACE DSP NUMBER OF LEFT CHAR OF THE PAIR INTO
R0711  DSPCOUNT. THIS NUMBER IS LEFT IN DSPCOUNT
```

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```
0712  REF  16 LAST 248    04,2557  3 0270 1  23LANK    CA      DSPCOUNT
0713  REF  10 LAST 230    04,2560  54 021 0             TS      SR
0714  REF   1             04,2561  4 2572 1             CS      BLANKCON
0715                      04,2562  0 0004 0             INHINT
0716  REF  11 LAST 249    04,2563  50 021 1             INDEX   SR
0717  REF  29 LAST 246    04,2564  56 313 0             XCH     DSPTAB
0718                      04,2565  0 0006 1             EXTEND
0719                      04,2566  6 2570 1             BZMF    +2          IF OLD CONTENTS -, NOUT OK
0720  REF   5 LAST 107    04,2567  24 307 0             INCR    NOUT        IF OLD CONTENTS +, +1 TO NOUT
0721                      04,2570  0 0003 1             RELINT              IF -,NOUT OK
0722  REF  80 LAST 248    04,2571  0 0002 0             TC      Q
0723                      04,2572   04000 0  BLANKCON   OCT     4000
```

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```
P0724   ENTER PASS 0 IS THE EXECUTE FUNCTION. HIGHER ORDER ENTERS ARE TO LOAD
R0725   DATA. THE SIGN OF REQRET DETERMINES THE PASS, + FOR PASS 0,- FOR HIGHER
R0726   PASSES.


R0727   MACHINE CADR TO BE SPECIFIED (MCTBS) NOUNS DESIRE AN ECADR TO BE LOADED
R0728   WHEN USED WITH LOAD VERBS, MONITOR VERBS, OR DISPLAY VERBS (EXCEPT
R0729   VERB = FIXED MEMORY DISPLAY, WHICH REQUIRES AN ECADR).


0730                                    05,2000             SETLOC 22000

0731    REF   1                 05,2000  0 3344 1  NVSUBB   TC     NVSUB1      STANDARD LEAD INS. DONT MOVE.
0732    REF   2 LAST  77        05,2001  1 3403 1  DSPMM    TCF    DSPMM1
0733    REF   1                 05,2002  0 2663 0  LOADLV1  TC     LOADLV
A0734                                                               END OF STANDARD LEAD INS.


0735    REF  54 LAST 248        05,2003  3 7767 0  ENTER    CAF    ZERO
0736    REF   8 LAST 247        05,2004  54 306 0            TS     CLPASS
0737    REF   2 LAST 244        05,2005  3 4505 0            CAF    ENDINST
0738    REF   2 LAST 244        05,2006  54 126 0            TS     ENTRET
0739    REF   4 LAST 247        05,2007  10 304 1            CCS    REQRET
0740    REF   1                 05,2010  0 2031 1           TC     ENTPASO     IF +, PASS 0
0741    REF   2 LAST 250        05,2011  0 2031 1           TC     ENTPASO     IF +, PASS 0
0742                            05,2012  0 2013 1           TC     +1          IF -, NOT PASS 0
0743    REF  11 LAST 245        05,2013  3 6311 1           CAF    THREF       IF DEC, ALARM IF LESS THAN 5 CHAR IN,
0744    REF  10 LAST 248        05,2014  7 0271 1           MASK   DECBRNCH    BUT LEAVE REQRET - AND FLASH ON, SO
0745    REF 147 LAST 247        05,2015  10 000 0           CCS    A           OPERATOR CAN SUPPLY MISSING NUMERICAL
0746                            05,2016  0 2020 1           TC     +2          CHARACTERS AND CONTINUE,
0747    REF   1                 05,2017  0 2024 0           TC     ACCEPTWD    OCTAL, ANY NUMBER OF CHAR OK.
0748    REF  17 LAST 249        05,2020  10 270 0           CCS    DSPCOUNT
0749    REF   1                 05,2021  0 2324 0           TC     GODSPALM    LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
0750    REF   2 LAST 250        05,2022  0 2324 0           TC     GODSPALM    LESS THAN 5 CHAR DEC(DSPCOUNT IS +)
0751                            05,2023  0 2024 0           TC     +1          5 CHAR IN (DSPCOUNT IS -)
0752    REF   5 LAST 250        05,2024  4 0304 1  ACCEPTWD CS     REQRET      5 CHAR IN (DSPCOUNT IS -)
0753    REF   6 LAST 250        05,2025  54 304 1           TS     REQRET      SET REQRET +.
0754    REF   2 LAST 207        05,2026  0 4626 1           TC     FLASHOFF
0755    REF   7 LAST 250        05,2027  0 0304 0           TC     REQRET


0756    REF   3 LAST 250                   0126  ENTEXIT  =      ENTRET

0757                            05,2030   00030 1  LOWVERB  OCT    30          LOWER VERB THAT AVOIDS NOUN TEST

0758    REF  65 LAST 250        05,2031  3 7767 0  ENTPASO  CAF    ZERO        NOUN VERB SUB ENTERS HERE
0759    REF  11 LAST 250        05,2032  54 271 1           TS     DECBRNCH
0760    REF   9 LAST 248        05,2033  4 0272 1  TESTVB   CS     VERBREG     IF VERB IS 30-77, SKIP NOUN TEST
```

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```
0761   REF   1                 05,2034  6 2030 0          AD      LOWVERB     30=VB
0762                           05,2035  0 0006 1          EXTEND
0763   REF   1                 05,2036  6 2116 0          BZMF    VERBFAN     VERB G/E 30
0764                           05,2037  0 0006 1  TESTNN   EXTEND              VERB L/ 30
0765   REF   1                 05,2040  3 2076 1          DCA     LODNNLOC    SWITCH BANKS TO NOUN TABLE READING
0766   REF   2 LAST  77        05,2041  52 006 0          DXCH    Z           ROUTINE.
0767   REF   1                 05,2042  50 130 0          INDEX   MIXBR
0768                           05,2043  0 2043 1          TC      +0
0769                           05,2044  0 2046 1          TC      +2          NORMAL
0770   REF   1                 05,2045  0 2176 0          TC      MIXNOUN     MIXED
0771   REF   1                 05,2046  10 136 1          CCS     NNADTEM     NORMAL
0772   REF   2 LAST 251        05,2047  0 2114 1          TC      VERBFAN -2          NORMAL IF +
0773   REF   3 LAST 250        05,2050  0 2324 0          TC      GODSPALM    NOT IN USE   IF +0
0774   REF   1                 05,2051  0 2055 0          TC      REQADD      SPECIFY MACHINE CADR IF -
0775   REF   1                 05,2052  24 310 0          INCR    NOUNCADR    AUGMENT MACHINE CADR IF -0
0776   REF   1                 05,2053  0 4521 0          TC      SETNADD     ECADR FROM NOUNCADR, SETS EB, NOUNADD.
0777   REF   1                 05,2054  0 2102 0          TC      INTMCTBS +2
0778   REF   17 LAST 245       05,2055  3 7745 0  REQADD  CAF     BIT15       SET CLPASS FOR PASS0 ONLY
0779   REF   9 LAST 250        05,2056  54 306 0          TS      CLPASS
0780   REF   3 LAST 250        05,2057  4 4505 1          CS      ENDINST     TEST IF REACHED HERE FROM INTERNAL OR
0781   REF   1                 05,2060  6 0126 1          AD      ENTEXIT             FROM EXTERNAL
0782                           05,2061  0 0006 1          EXTEND
0783                           05,2062  1 2064 0          BZF     +2          EXTERNAL MACH CADR TO BE SPECIFIED
0784   REF   2 LAST 251        05,2063  0 2100 1          TC      INTMCTBS
0785   REF   1                 05,2064  0 2256 1          TC      REQDATZ     EXTERNAL MACH CADR TO BE SPECIFIED
0786   REF   12 LAST 250       05,2065  10 271 1          CCS     DECBRNCH
0787   REF   4 LAST 251        05,2066  0 2324 0          TC      GODSPALM    ALARM IF DECIMAL USED FOR MCTBS
0788   REF   1                 05,2067  56 276 1          XCH     ZREG        OCTAL USED   OK
0789   REF   1                 05,2070  0 4513 1          TC      SETNCADR    ECADR INTO NOUNCADR, SET EB, NOUNADD.
0790                           05,2071  0 0006 1          EXTEND
0791   REF   2 LAST 251        05,2072  3 2076 1          DCA     LODNNLOC    SWITCH BANKS TO NOUN TABLE READING
0792   REF   3 LAST 251        05,2073  52 006 0          DXCH    Z           ROUTINE.
0793   REF   3 LAST 251        05,2074  0 2116 0          TC      VERBFAN

0794   REF   18 LAST 250                      E0          EBANK=  DSPCOUNT
0795                           05,2075    02000 0  LODNNLOC 2CADR  LODNNTAB
C0795  REF   1                 05,2076    46060 0
0796                           05,2077    77772 0  NEG5    OCT     77772

0797   REF   87 LAST 242       05,2100  3 0146 1  INTMCTBS CA      MPAC    +2  INTERNAL MACH CADR TO BE SPECIFIED.
0798   REF   2 LAST 251        05,2101  0 4513 1          TC      SETNCADR    ECADR INTO NOUNCADR. SET EB, NOUNADD.
0799   REF   22 LAST 224       05,2102  4 7760 0          CS      BIT4        NVSUB CALL LEFT CADR IN MPAC+2 FOR MACH
0800   REF   10 LAST 250       05,2103  7 0272 1          MASK    VERBREG     CADR TO BE SPECIFIED.
0801   REF   1                 05,2104  6 2077 0          AD      NEG5        MASKING MAKES VB15 LOOK LIKE VB05.
0802                           05,2105  0 0006 1          EXTEND
0803   REF   4 LAST 251        05,2106  1 2116 1          BZF     VERBFAN     VB = 05 OR 15, DO NOT DISPLAY CADR.
0804   REF   2 LAST 245        05,2107  3 4531 1          CAF     R3D1        VB NOT = 05 OR 15, DISPLAY CADR.
0805   REF   19 LAST 251       05,2110  54 270 0          TS      DSPCOUNT
0806   REF   2 LAST 251        05,2111  3 0310 0          CA      NOUNCADR
0807   REF   1                 05,2112  0 3222 0          TC      DSPDCTWD
```

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```
0808  REF   5 LAST 251   05,2113  0 2116 0            TC     VERBFAN

0809  REF  44 LAST 247   05,2114  6 7763 1            AD     ONE
0810  REF   3 LAST 251   05,2115  0 4513 1            TC     SETNCADR        ECADR INTO NOUNCADR, SETS EB, NOUNADD,
0811  REF   1            05,2116  4 2131 1  VERBFAN   CS     LST2CON
0812  REF  11 LAST 251   05,2117  6 0272 0            AD     VERBREG         VERB-LST2CON
0813  REF 148 LAST 250   05,2120 10 000 0             CCS    A
0814  REF  45 LAST 252   05,2121  6 7763 1            AD     ONE             VERB G/ LST2CON
0815                     05,2122  0 2124 1            TC     +2
0816  REF   1            05,2123  0 2133 1            TC     VBFANDIR        VERB L/ LST2CON
0817  REF  98 LAST 251   05,2124 54 144 1            TS     MPAC
0818  REF   3 LAST 241   05,2125  0 4666 0            TC     RELDSP          RELEASE DISPLAY SYST
0819  REF  39 LAST 252   05,2126 56 144 0            XCH    MPAC            ALSO TURN OFF RELEASE DISPLAY SYST LIGHT
0820  REF   1            05,2127  6 2132 0            AD     LST2CADR
0821  REF   5 LAST 220   05,2130  0 5230 0            TC     BANKJUMP
0822                     05,2131  00040 0  LST2CON    OCT    40              FIRST LST2 VERB
0823  REF   1            05,2132  22000 1  LST2CADR   CADR   LST2FAN

0824  REF  12 LAST 252   05,2133 50 272 0  VBFANDIR  INDEX  VERBREG
0825  REF   1            05,2134  3 2136 1            CAF    VERBTAB
0826  REF   6 LAST 252   05,2135  0 5230 0            TC     BANKJUMP

0827  REF   5 LAST 251   05,2136  12324 1  VERBTAB   CADR   GODSPALM       VB00 ILLEGAL
0828  REF   1            05,2137  12340 0            CADR   DSPA            VB01 DISPLAY OCT COMP 1 (R1)
0829  REF   1            05,2140  12345 0            CADR   DSPB            VB02 DISPLAY OCT COMP 2 (R1)
0830  REF   1            05,2141  12352 0            CADR   DSPC            VB03 DISPLAY OCT COMP 3 (R1)
0831  REF   1            05,2142  12333 1            CADR   DSPAB           VB04 DISPLAY OCT COMP 1,2 (R1,R2)
0832  REF   1            05,2143  12326 0            CADR   DSPABC          VB05 DISPLAY OCT COMP 1,2,3 (R1,R2,R3)
0833  REF   1            05,2144  12445 1            CADR   DECDSP          VB06 DECIMAL DISPLAY
0834  REF   1            05,2145  10722 1            CADR   DSPDPDEC        VB07 DP DECIMAL DISPLAY (R1,R2)
0835  REF   1            05,2146  11315 0            CADR   DSPALARM        VB10 SPARE
0836  REF   1            05,2147  13077 0            CADR   MONITOR         VB11 MONITOR OCT COMP 1 (R1)
0837  REF   2 LAST 252   05,2150  13077 0            CADR   MONITOR         VB12 MONITOR OCT COMP 2 (R1)
0838  REF   3 LAST 252   05,2151  13077 0            CADR   MONITOR         VB13 MONITOR OCT COMP 3 (R1)
0839  REF   4 LAST 252   05,2152  13077 0            CADR   MONITOR         VB14 MONITOR OCT COMP 1,2 (R1,R2)
0840  REF   5 LAST 252   05,2153  13077 0            CADR   MONITOR         VB15 MONITOR OCT COMP 1,2,3 (R1,R2,R3)
0841  REF   6 LAST 252   05,2154  13077 0            CADR   MONITOR         VB16 MONITOR DECIMAL
0842  REF   7 LAST 252   05,2155  13077 0            CADR   MONITOR         VB17 MONITOR DP DEC  (R1,R2)
0843  REF   6 LAST 252   05,2156  12324 1            CADR   GODSPALM        VB20 SPARE
0844  REF   1            05,2157  12620 0            CADR   ALOAD           VB21 LOAD COMP 1 (R1)
0845  REF   1            05,2160  12631 0            CADR   BLOAD           VB22 LOAD COMP 2 (R2)
0846  REF   1            05,2161  12646 0            CADR   CLOAD           VB23 LOAD COMP 3 (R3)
0847  REF   1            05,2162  12572 1            CADR   ABLOAD          VB24 LOAD COMP 1,2 (R1,R2)
0848  REF   1            05,2163  12535 1            CADR   ABCLOAD         VB25 LOAD COMP 1,2,3 (R1,R2,R3)
0849  REF   7 LAST 252   05,2164  12324 1            CADR   GODSPALM        VB26 SPARE
0850  REF   1            05,2165  13214 1            CADR   DSPFMEM         VB27 FIXED MEMORY DISPLAY
A0851                                                                      THE FOLLOWING VERBS MAKE NO NOUN TEST
0852  REF   1            05,2166  13314 0  REQEXLOC  CADR   VBRQEXEC       VB30 REQUEST EXECUTIVE
0853  REF   1            05,2167  13340 1            CADR   VBRQWAIT        VB31 REQUEST WAITLIST
0854  REF   1            05,2170  11343 0            CADR   BUMP            VB32 C(R2) INTO R3, C(R1) INTO R2
```

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```
0855  REF  1        05,2171  11326 0        CADR  VBPROC     VB33 PROCEED WITHOUT DATA
0856  REF  1        05,2172  11333 1        CADR  VBTERM     VB34 TERMINATE CURRENT TEST OR LOAD REQ
0857  REF  1        05,2173  13414 1        CADR  VBTSTLTS   VB35 TEST LIGHTS
0858  REF  1        05,2174  02000 0        CADR  SLAP1      VB36 FRESH START
0859  REF  1        05,2175  13267 0 ENDVBFAN CADR  MMCHANG   VB37 CHANGE MAJOR MODE
```

R0860 THE LIST2 VERBFAN IS LOCATED IN THE EXTENDED VERB BANK.

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P0861   NNADTAB CONTAINS A RELATIVE ADDRESS, IDADDREL(IN LOW 10 BITS), REFERRING
R0862   TO WHERE 3 CONSECUTIVE ADDRESSES ARE STORED (IN IDADDTAB).
R0863   MIXNOUN GETS DATA AND STORES IN MIXTEMP,+1,+2. IT SETS NOUNADD FOR
R0864    MIXTEMP.

 0865   REF   2 LAST 251     05,2176  10 136 1  MIXNOUN  CCS     NNADTEM
 0866                        05,2177  0 2203 1           TC      +4              +  IN USE
 0867   REF   8 LAST 252     05,2200  0 2324 0           TC      GODSPALM        +0  NOT IN USE
 0868                        05,2201  0 2203 1           TC      +2              -  IN USE
 0869                        05,2202  0 2203 1           TC      +1              -0  IN USE
 0870   REF   6 LAST 213     05,2203  4 6306 0           CS      SIX
 0871   REF  13 LAST 252     05,2204  6 0272 0           AD      VERBREG
 0872                        05,2205  0 0006 1           EXTEND
 0873                        05,2206  6 2210 0           BZMF    +2              VERB L/E 6
 0874   REF   6 LAST 252     05,2207  0 2116 0           TC      VERBFAN         AVOID MIXNOUN SWAP IF VB NOT = DISPLAY
 0875   REF  22 LAST 248     05,2210  3 7762 0           CAF     TWO
 0876   REF   1              05,2211  54 107 0  MIXNN1   TS      DECOUNT
 0877   REF   1              05,2212  6 2235 1           AD      MIXAD
 0878   REF   1              05,2213  54 135 1           TS      NOUNADD         SET NOUNADD TO MIXTEMP + K
 0879   REF   2 LAST 254     05,2214  50 107 1           INDEX   DECOUNT         GET IDADDTAB ENTRY FOR COMPONENT <
 0880   REF   1              05,2215  3 0140 1           CA      IDADDTEM        OF NOUN.
 0881   REF   1              05,2216  54 112 1           TS      NOUNTEM
A0882                                                                           TEST FOR DP(FOR OCT DISPLAY). IF SO, GET
A0883                                                                            MINOR PART ONLY.
 0884   REF   1              05,2217  0 2721 1           TC      SFRUTMIX        GET SF ROUT NUMBER IN A
 0885   REF   1              05,2220  0 2236 1           TC      DPTEST
 0886   REF   1              05,2221  0 2223 0           TC      MIXNN2          NO DP
 0887   REF   2 LAST 254     05,2222  24 112 0           INCR    NOUNTEM         DP  GET MINOR PART
 0888   REF   3 LAST 254     05,2223  3 0112 0  MIXNN2   CA      NOUNTEM
 0889   REF   4 LAST 107     05,2224  7 4563 1           MASK    LOW11           ESUBK (NO DP)  OR (ESUBK)+1     FOR DP
 0890   REF   1              05,2225  0 4523 1           TC      SETEBANK        SET EBANK, LEAVE EADRES IN A.
 0891   REF 149 LAST 252     05,2226  50 000 1           INDEX   A               PICK UP C(ESUBK)  NOT DP
 0892                        05,2227  3 0000 1           CA      0               OR C((ESUBK)+1)  FOR DP MINOR PART
 0893   REF   2 LAST 254     05,2230  50 135 0           INDEX   NOUNADD
 0894                        05,2231  56 000 1           XCH     0               STORE IN MIXTEM + K
 0895   REF   3 LAST 254     05,2232  10 107 0           CCS     DECOUNT
 0896   REF   1              05,2233  0 2211 1           TC      MIXNN1
 0897   REF   7 LAST 254     05,2234  0 2116 0           TC      VERBFAN

 0898   REF   3 LAST 247     05,2235  0 0115 1  MIXAD    TC      MIXTEMP


R0899   DPTEST   ENTER WITH SF ROUT NUMBER IN A.
R0900            RETURNS TO L+1 IF NO DP.
R0901            RETURNS TO L+2 IF DP.

 0902   REF 150 LAST 254     05,2236  50 000 1  DPTEST   INDEX   A
 0903                        05,2237  1 2240 1           TCF     +1
 0904   REF  81 LAST 249     05,2240  0 0002 0           TC      Q               OCTAL ONLY  NO DP
```

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```
0905  REF  82 LAST 254   05,2241  0 0002 0            TC     Q              FRACT NO DP
0906  REF  83 LAST 255   05,2242  0 0002 0            TC     Q              DEG  NO DP
0907  REF  84 LAST 255   05,2243  0 0002 0            TC     Q              ARITH  NO DP
0908  REF   1            05,2244  1 2250 0            TCF    DPTEST1        DP1OUT
0909  REF   2 LAST 255   05,2245  1 2250 0            TCF    DPTEST1        DP2OUT
0910  REF  85 LAST 255   05,2246  0 0002 0            TC     Q              OPDEG  NO DP
0911  REF   3 LAST 255   05,2247  1 2250 0            TCF    DPTEST1        DP3OUT
0912  REF  86 LAST 255   05,2250 50 002 0 DPTEST1     INDEX  Q
0913                     05,2251  0 0001 0            TC     1              RETURN TO L+2


0914  REF   3 LAST 248   05,2252  3 4527 0 REQDATX    CAF    R1D1
0915  REF   1            05,2253  1 2257 1            TCF    REQCOM
0916  REF   2 LAST 245   05,2254  3 4530 0 REQDATY    CAF    R2D1
0917  REF   2 LAST 255   05,2255  1 2257 1            TCF    REQCOM
0918  REF   3 LAST 251   05,2256  3 4531 1 REQDATZ    CAF    R3D1
0919  REF  20 LAST 251   05,2257 54 270 0 REQCOM      TS     DSPCOUNT
0920  REF  87 LAST 255   05,2260  4 0002 1            CS     Q
0921  REF   8 LAST 250   05,2261 54 304 1            TS     REQRET
0922  REF  19 LAST 247   05,2262  0 5206 0            TC     BANKCALL
0923  REF   2 LAST 247   05,2263   10514 0           CADR   5BLANK
0924  REF   4 LAST 220   05,2264  0 4622 0            TC     FLASHON
0925  REF   4 LAST 251   05,2265  4 4505 1            CS     ENDINST
0926  REF   2 LAST 251   05,2266  6 0126 1            AD     ENTEXIT
0927                     05,2267  0 0006 1            EXTEND
0928  REF   1            05,2270  1 2273 1            BZF    ENDRQDAT       ENTEXIT = ENDOFJOB, EXTERNALLY INITIATED
0929  REF  56 LAST 250   05,2271  4 7767 1            CS     ZERO           ENTEXIT NOT ENDOFJOB, NVSUB INITIATED
0930  REF   4 LAST 166   05,2272 54 327 0            TS     CADRSTOR       NVSUB INITIATED LOAD, SET CADRSTOR TO -0
0931  REF   3 LAST 255   05,2273  0 0126 1 ENDRQDAT  TC     ENTEXIT

R0932  IF NVSUB INITIATED LOAD, SET CADRSTOR TO -0 TO TELL RECALTST TO RELEASE
R0933  DISPLAY IF ENDIDLE WAS NOT USED. (NECESSARY FOR DATAWAIT)


0934  REF   4 LAST 244   05,2274 54 273 0            TS     NOUNREG
0935  REF  88 LAST 255   05,2275 56 002 0 JPDATNN    XCH    Q
0936  REF   1            05,2276 54 107 0            TS     JPDATRET
0937                     05,2277  0 0006 1            EXTEND
0938  REF   3 LAST 251   05,2300  3 2076 1            DCA    LODNNLOC       SWITCH BANKS TO NOUN TABLE READING
0939  REF   4 LAST 251   05,2301 52 006 0            DXCH   Z              ROUTINE.
0940  REF   3 LAST 254   05,2302 10 136 1            CCS    NNADTEM
0941  REF  46 LAST 252   05,2303  6 7763 1            AD     ONE            NORMAL
0942  REF   1            05,2304  1 2307 0            TCF    PUTAND
0943  REF   2 LAST 255   05,2305  1 2310 0            TCF    PUTADD  +1     MCTBS  DONT CHANGE NOUNADD
0944  REF   3 LAST 255   05,2306  1 2310 0            TCF    PUTADD  +1     MCTBI  DONT CHANGE NOUNADD
0945  REF   4 LAST 252   05,2307  0 4513 1 PUTADD     TC     SETNCADR       ECADR INTO NOUNCADR, SETS EB, NOUNADD.
0946  REF   2 LAST 244   05,2310  3 4566 0            CAF    ND1
0947  REF  21 LAST 255   05,2311 54 270 0            TS     DSPCOUNT
```

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```
0948   REF   5 LAST 255     05,2312  3 0273 1            CA     NOJNREG
0949   REF   1              05,2313  1 2322 1            TCF    JPDAT1

0950   REF  14 LAST 254     05,2314  54 272 1            TS     VERBREG
0951   REF  39 LAST 255     05,2315  56 002 0  JPDATV3   XCH    Q
0952   REF   2 LAST 255     05,2316  54 107 0            TS     JPDATRET
0953   REF   3 LAST 243     05,2317  3 4565 0            CAF    VD1
0954   REF  22 LAST 255     05,2320  54 270 0            TS     DSPCOUNT
0955   REF  15 LAST 256     05,2321  3 0272 0            CA     VERBREG
0956   REF   1              05,2322  0 3255 0  JPDAT1    TC     DSP2RIT
0957   REF   3 LAST 256     05,2323  0 0107 1            TC     JPDATRET


0958   REF  16 LAST 241     05,2324  0 5225 1  GODSPALM  TC     POSTJUMP
0959   REF   2 LAST 252     05,2325   11315 0            CADR   DSPALARM
```

```
P0960           NOUN   TABLES
R0961   NOUN CODE L/ 55, NORMAL CASE.  NOUN CODE G/E 55, MIXED NOUN CASE.
R0962   FOR NORMAL CASE, NNADTAB CONTAINS ONE       ECADR      FOR EACH NOUN.
R0963   +0 INDICATES NOUN NOT USED.   - ENTRY INDICATES MACHINE CADR(E OR F) TO
R0964   BE SPECIFIED. -1 INDICATES CHANNEL TO BE SPECIFIED. -0 INDICATES AUGMENT
R0965   OF LAST MACHINE CADR SUPPLIED.

R0966   FOR MIXED CASE, NNADTAB CONTAINS ONE INDIRECT ADDRESS(IDADDREL) IN LOW
R0967   10 BITS, AND THE COMPONENT CODE NUMBER IN THE HIGH 5 BITS.

R0968   NNTYPTAB IS A PACKED TABLE OF THE FORM MMMMMNNNNNPPPPP.

R0969   FOR THE NORMAL CASE, M-S ARE THE COMPONENT CODE NUMBER.
R0970                     N-S ARE THE SF ROUTINE CODE NUMBER.
R0971                     P-S ARE THE SF CONSTANT CODE NUMBER.

R0972   MIXED CASE,M-S ARE THE SF CONSTANT3 CODE NUMBER     3 COMPONENT CASE
R0973              N-S ARE THE SF CONSTANT2 CODE NUMBER
R0974              P-S ARE THE SF CONSTANT1 CODE NUMBER
R0975              N-S ARE THE SF CONSTANT2 CODE NUMBER     2 COMPONENT CASE
R0976              P-S ARE THE SF CONSTANT1 CODE NUMBER
R0977              P-S ARE THE SF CONSTANT1 CODE NUMBER      1 COMPONENT CASE

R0978   THERE IS ALSO AN INDIRECT ADDRESS TABLE(IDADDTAB) FOR MIXED CASE ONLY.
R0979   EACH ENTRY CONTAINS ONE ECADR.    IDADDREL IS THE RELATIVE ADDRESS OF
R0980   THE FIRST OF THESE ENTRIES.
R0981   THERE IS ONE ENTRY IN THIS TABLE FOR EACH COMPONENT OF A MIXED NOUN
R0982   THEY ARE LISTED IN ORDER OF ASCENDING K.

R0983   THERE IS ALSO A SCALE FACTOR ROUTINE NUMBER TABLE( RUTMXTAB ) FOR MIXED
R0984   CASE ONLY. THERE IS ONE ENTRY PER MIXED NOUN. THE FORM IS,
R0985        QQQQQRRRRRSSSSS
R0986   Q-S ARE THE SF ROUTINE 3 CODE NUMBER     3 COMPONENT CASE
R0987   R-S ARE THE SF ROUTINE 2 CODE NUMBER
R0988   S-S ARE THE SF ROUTINE 1 CODE NUMBER
R0989   R-S ARE THE SF ROUTINE 2 CODE NUMBER     2 COMPONENT CASE
R0990   S-S ARE THE SF ROUTINE 1 CODE NUMBER



R0991   IN OCTAL DISPLAY AND LOAD (OCT OR DEC) VERBS, EXCLUDE USE OF VERBS WHOSE
R0992   COMPONENT NUMBER IS GREATER THAN THE NUMBER OF COMPONENTS IN NOUN.
R0993   ALL MACHINE ADDRESS TO BE SPECIFIED NOUNS ARE 1 COMPONENT.
R0994   ONLY EXCEPTION IS NOUN 01 TO ALLOW OCTAL DISPLAYS AND LOADS OF
R0995   AN UNCONTOLLED NUMBER OF COMPONENTS.



R0996   IN MULTI-COMPONENT LOAD VERBS, NO MIXING OF OCTAL AND DECIMAL DATA
R0997   COMPONENT WORDS IS ALLOWED. ALARM IF VIOLATION.
```

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R0998 IN DECIMAL LOADS OF DATA, 5 NUMERICAL CHARACTERS MUST BE KEYED IN
R0999 BEFORE EACH ENTER. IF NOT, ALARM.

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```
P1000           DISPLAY VERBS
 1001   REF  23 LAST 254     05,2326  4 7762 1  DSPABC   CS     TWO
 1002   REF   1             05,2327  0 2376 1           TC     COMPTEST
 1003   REF   3 LAST 254    05,2330  50 135 0           INDEX  NOJNADD
 1004                       05,2331  4 0002 1           CS     2
 1005   REF  11 LAST 205    05,2332  56 122 0           XCH    BUF     +2
 1006   REF  47 LAST 255    05,2333  4 7763 0  DSPAB    CS     ONE
 1007   REF   2 LAST 259    05,2334  0 2376 1           TC     COMPTEST
 1008   REF   4 LAST 259    05,2335  50 135 0           INDEX  NOJNADD
 1009                       05,2336  4 0001 1           CS     1
 1010   REF  12 LAST 259    05,2337  56 121 0           XCH    BUF     +1
 1011   REF   1             05,2340  0 2420 0  DSPA     TC     TSTFORDP
 1012   REF   5 LAST 259    05,2341  50 135 0           INDEX  NOJNADD
 1013                       05,2342  4 0000 0           CS     0
 1014   REF  13 LAST 259    05,2343  56 120 1  DSPCOM1  XCH    BUF
 1015   REF   1             05,2344  0 2357 1           TC     DSPCOM2
 1016   REF  48 LAST 259    05,2345  4 7763 0  DSPB     CS     ONE
 1017   REF   3 LAST 259    05,2346  0 2376 1           TC     COMPTEST
 1018   REF   6 LAST 259    05,2347  50 135 0           INDEX  NOJNADD
 1019                       05,2350  4 0001 1           CS     1
 1020   REF   1             05,2351  0 2343 1           TC     DSPCOM1
 1021   REF  24 LAST 259    05,2352  4 7762 1  DSPC     CS     TWO
 1022   REF   4 LAST 259    05,2353  0 2376 1           TC     COMPTEST
 1023   REF   7 LAST 259    05,2354  50 135 0           INDEX  NOJNADD
 1024                       05,2355  4 0002 1           CS     2
 1025   REF   2 LAST 259    05,2356  0 2343 1           TC     DSPCOM1
 1026   REF  25 LAST 259    05,2357  4 7762 1  DSPCOM2  CS     TWO             A  B  C  AB  ABC
 1027   REF  16 LAST 256    05,2360  6 0272 0           AD     VERBREG         -1 -0 +1 +2  +3   IN A
 1028   REF 151 LAST 254    05,2361  10 000 0           CCS    A               +0 +0 +0 +1  +2    IN A AFTER CCS
 1029   REF   1             05,2362  0 2365 0           TC     DSPCOM3
 1030   REF   4 LAST 255    05,2363  0 0126 1           TC     ENTEXIT
 1031                       05,2364  0 2365 0           TC     +1
 1032   REF   1             05,2365  54 112 1  DSPCOM3  TS     DISTEM          +0,+1,+2 INTO DISTEM
 1033   REF 152 LAST 259    05,2366  50 000 1           INDEX  A
 1034   REF   4 LAST 255    05,2367  3 4527 0           CAF    R1D1
 1035   REF  23 LAST 256    05,2370  54 270 0           TS     DSPCOUNT
 1036   REF   2 LAST 259    05,2371  50 112 0           INDEX  DISTEM
 1037   REF  14 LAST 259    05,2372  4 0120 0           CS     BUF
 1038   REF   2 LAST 251    05,2373  0 3222 0           TC     DSPOCTWD
 1039   REF   3 LAST 259    05,2374  56 112 0           XCH    DISTEM
 1040   REF   2 LAST 259    05,2375  0 2361 1           TC     DSPCOM2 +2

R1041   COMPTEST ALARMS IF COMPONENT NUMBER OF VERB(LOAD OR OCT DISPLAY) IS
R1042   GREATER THAN THE HIGHEST COMPONENT NUMBER OF NOUN.
R1043   NOUN 01 IS EXCLUDED FROM TEST.
 1044   REF   1             05,2376  54 113 0  COMPTEST TS     SFTEMP1         - VERB COMP
 1045   REF  90 LAST 256    05,2377  22 002 0           LXCH   Q
 1046   REF  49 LAST 259    05,2400  4 7763 0  COMPTST1 CS     ONE
 1047   REF   6 LAST 256    05,2401  6 0273 1           AD     NOJNREG
 1048                       05,2402  0 0006 1           EXTEND
```

```
1049  REF   1                 05,2403  1 2417 0            BZF     NOCMPTST        NOUN = 01, ANY COMP OK
1050  REF   2 LAST 251        05,2404  50 130 0            INDEX   MIXBR           NOUN NOT = 01.
1051  REF   1                 05,2405  3 2442 1            CAF     COMPICK -1
1052  REF 153 LAST 259        05,2406  50 000 1            INDEX   A
1053                          05,2407  3 0000 1            CA      0
1054  REF   2 LAST 107        05,2410  7 4560 1            MASK    HI5
1055  REF   1                 05,2411  0 4541 0            TC      LEFT5           NOUN COMP
1056  REF   2 LAST 259        05,2412  6 0113 1            AD      SFTEMP1         NOUN COMP - VERB COMP
1057  REF 154 LAST 260        05,2413  10 000 0            CCS     A
1058  REF  51 LAST 248        05,2414  0 0001 0            TC      L               NOUN COMP G/ VERB COMP
1059  REF   3 LAST 248        05,2415  0 4736 1            TC      CCSHOLE
1060  REF   9 LAST 254        05,2416  0 2324 0            TC      GODSPALM        NOUN COMP L/ VERB COMP
1061  REF  52 LAST 260        05,2417  0 0001 0  NOCMPTST  TC      L               NOUN COMP = VERB COMP


1062  REF  91 LAST 259        05,2420  22 002 0  TSTFORDP   LXCH    Q               TEST FOR DP. IF SO, GET MINOR PART ONLY.
1063  REF   4 LAST 255        05,2421  3 0136 0            CA      NNADTEM
1064  REF  50 LAST 259        05,2422  6 7763 1            AD      ONE             IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
1065                          05,2423  0 0006 1            EXTEND
1066  REF   1                 05,2424  1 2436 0            BZF     CHANDSP
1067  REF   3 LAST 260        05,2425  50 130 0            INDEX   MIXBR
1068                          05,2426  0 2426 0            TC      +0
1069                          05,2427  0 2431 0            TC      +2              NORMAL
1070  REF  53 LAST 260        05,2430  0 0001 0            TC      L               MIXED CASE ALREADY HANDLED IN MIXNOUN
1071  REF   1                 05,2431  0 2713 0            TC      SFRJTNOR
1072  REF   2 LAST 254        05,2432  0 2236 1            TC      DPTEST
1073  REF  54 LAST 260        05,2433  0 0001 0            TC      L               NO DP
1074  REF   8 LAST 259        05,2434  24 135 0            INCR    NOUNADD         DP    E+1 INTO NOUNADD FOR MINOR PART.
1075  REF  55 LAST 260        05,2435  0 0001 0            TC      L


1076                          05,2436  0 0006 1  CHANDSP   EXTEND
1077  REF   3 LAST 251        05,2437  5 0310 0            INDEX   NOUNADR
1078                          05,2440  00 000 1            READ    0
1079  REF 155 LAST 260        05,2441  4 0000 0            CS      A
1080  REF   3 LAST 259        05,2442  1 2343 0            TCF     DSPCOM1


1081  REF   1                 05,2443   00137 1  COMPICK   ADRES   NNTYPTEM
1082  REF   5 LAST 260        05,2444   00136 0            ADRES   NNADTEM

1083  REF   4 LAST 260        05,2445  50 130 0  DECDSP    INDEX   MIXBR           NORMAL                  MIXED
1084  REF   2 LAST 260        05,2446  3 2442 1            CAF     COMPICK -1      ADRES NNTYPTEM          ADRES NNADTEM
1085  REF 156 LAST 260        05,2447  50 000 1            INDEX   A
1086                          05,2450  3 0000 1            CA      0               C(NNTYPTEM)             C(NNADTEM)
1087  REF   3 LAST 260        05,2451  7 4560 1            MASK    HI5             GET HI5 OF NNTYPTAB(NORM)OF NNADTAB(MIX)
1088  REF   2 LAST 260        05,2452  0 4541 0            TC      LEFT5
```

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```
1089   REF   4 LAST 254    05,2453   54 107 0            TS      DECOUNT         COMP NUMBER INTO DECOUNT
1090   REF   1             05,2454   54 112 1  DSPDCGET  TS      DECTEM          PICKS UP DATA
1091   REF   9 LAST 260    05,2455   6 0135 0            AD      NOJNADD         DECTEM  1COMP +0, 2COMP +1, 3COMP +2
1092   REF 157 LAST 260    05,2456   50 000 1            INDEX   A
1093                        05,2457   4 0000 0            CS      0
1094   REF   2 LAST 261    05,2460   50 112 0            INDEX   DECTEM
1095   REF   1             05,2461   56 274 0            XCH     XREG            CANT USE BUF SINCE DMP USES IT.
1096   REF   3 LAST 261    05,2462   10 112 1            CCS     DECTEM
1097   REF   1             05,2463   0 2454 0            TC      DSPDCGET        MORE TO GET
1098   REF  67 LAST 255    05,2464   3 7767 0  DSPDCPJT  CAF     ZERO            DISPLAYS DATA
1099   REF  90 LAST 252    05,2465   54 145 0            TS      MPAC      +1    DECOUNT 1COMP +0, 2COMP +1, 3COMP +2
1100   REF  91 LAST 261    05,2466   54 146 0            TS      MPAC      +2
1101   REF   5 LAST 261    05,2467   50 107 1            INDEX   DECOUNT
1102   REF   5 LAST 259    05,2470   3 4527 0            CAF     R1D1
1103   REF  24 LAST 259    05,2471   54 270 0            TS      DSPCOUNT
1104   REF   6 LAST 261    05,2472   50 107 1            INDEX   DECOUNT
1105   REF   2 LAST 261    05,2473   4 0274 1            CS      XREG
1106   REF  92 LAST 261    05,2474   54 144 1            TS      MPAC
1107   REF   1             05,2475   0 2734 0            TC      SFCONUM         2X( SF CON NUMB ) IN A
1108   REF   3 LAST 260    05,2476   54 113 0            TS      SFTEMP1
1109                        05,2477   0 0006 1            EXTEND                  SWITCH BANKS TO SF CONSTANT TABLE
1110   REF   1             05,2500   3 2512 0            DCA     GTSFOUTL          READING ROUTINE.
1111   REF   5 LAST 255    05,2501   52 006 0            DXCH    Z               LOADS SFTEMP1, SFTEMP2.
1112   REF   5 LAST 260    05,2502   50 130 0            INDEX   MIXBR
1113                        05,2503   0 2503 0            TC      +0
1114   REF   1             05,2504   0 2507 1            TC      DSPSFNOR
1115   REF   2 LAST 254    05,2505   0 2721 1            TC      SFRJTMIX
1116   REF   1             05,2506   0 2522 0            TC      DECDSP3

1117   REF   2 LAST 260    05,2507   0 2713 0  DSPSFNOR  TC      SFRJTNOR
1118   REF   2 LAST 261    05,2510   0 2522 0            TC      DECDSP3

1119   REF  25 LAST 261                 E0               EBANK=  DSPCOUNT
1120                        05,2511   02037 1  GTSFOUTL  2CADR   GTSFOUT
C1120  REF   1             05,2512   46060 0

1121   REF  20 LAST 255    05,2513   0 5206 0  DSPDCEND  TC      BANKCALL        ALL SFOUT ROUTINES END HERE
1122   REF   1             05,2514   11117 0             CADR    DSPDECWD
1123   REF   7 LAST 261    05,2515   10 107 0            CCS     DECOUNT
1124                        05,2516   0 2520 1            TC      +2
1125   REF   5 LAST 259    05,2517   0 0126 1            TC      ENTEXIT
1126   REF   8 LAST 261    05,2520   54 107 0            TS      DECOUNT
1127   REF   1             05,2521   0 2464 0            TC      DSPDCPUT        MORE TO DISPLAY

1128   REF 158 LAST 261    05,2522   50 000 1  DECDSP3   INDEX   A
1129   REF   1             05,2523   3 2525 1            CAF     SFOJTABR
1130   REF   7 LAST 252    05,2524   0 5230 0            TC      BANKJUMP
```

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```
1131  REF   3 LAST 256     05,2525  11315 0  SFOUTA3R CADR   DSPALARM      ALARM IF DEC DISP WITH OCTAL ONLY NOUN
1132  REF   1              05,2526  12513 0           CADR   DSPDCEND
1133  REF   1              05,2527  10573 1           CADR   DEGOUTSF
1134  REF   1              05,2530  10660 0           CADR   ART0UTSF
1135  REF   1              05,2531  10665 0           CADR   DP10UTSF
1136  REF   1              05,2532  10672 0           CADR   DP20UTSF
1137  REF   1              05,2533  10601 1           CADR   OPDEGOUT
1138  REF   1              05,2534  10674 0           CADR   DP30UTSF
1139                       05,2535  ENDRTOUT EQUALS
```

R1140 THE FOLLOWING IS ATYPICAL SF ROUTINE . IT USES MPAC. LEAVES RESU
R1141 LTS IN MPAC, MPAC+1. ENDS WITH TC DSPDCEN)

```
1142  REF   2 LAST 249              04,2573           SETLOC BLANKCON +1
```

R1143 DEGOUTSF SCALES BY .18 THE LOW 14 BITS OF ANGLE , ADDING .18 FOR
R1144 NUMBERS IN THE NEGATIVE (AGC) RANGE.

```
1145  REF  58 LAST 261     04,2573  3 7767 0  DEGOUTSF CAF    ZERO
1146  REF  93 LAST 261     04,2574  54 146 0           TS     MPAC    +2     SET INDEX FOR FULL SCALE
1147  REF   1              04,2575  0 2632 1           TC     FIXRANGE
1148                       04,2576  0 2600 0           TC     +2             NO AUGMENT NEEDED (SFTEMP1 AND 2 ARE 0)
1149  REF   1              04,2577  0 2625 1           TC     SETAUG         SET AUGMENTER ACCORDING TO C(MPAC +2)
1150  REF   1              04,2600  0 2643 1           TC     DEGCOM
```

R1151 OPDEGOUT SCALES BY .45 (THE RANGE IS 90 DEGREES) AND ADDS A 90 DEG BIAS.

```
1152  REF  94 LAST 262     04,2601  10 144 1  OPDEGOUT CCS    MPAC           RANGE IS 90 DEG
1153  REF  95 LAST 262     04,2602  56 144 0           XCH    MPAC           IF POS OR POS 0 THEN ADD BIAS AND
1154                       04,2603  0 2606 0           TC     +3             CORRECT FOR POSSIBLE OVERFLOW
1155  REF   1              04,2604  0 2615 1           TC     NEGODT         IF NEG NON ZERO
1156  REF   1              04,2605  6 7771 1           AD     NEG1           IF NEG ZERO SUBTRACT 1
1157  REF   1              04,2606  6 2657 1           AD     90BIAS
1158  REF  96 LAST 262     04,2607  54 144 1  BIASCOM  TS     MPAC           TEST FOR OVERFLOW
1159                       04,2610  0 2613 1           TC     +3             NO OVFLOW
1160  REF  18 LAST 251     04,2611  3 7745 0           CAF    BIT14          IF OVFLOW
1161  REF  97 LAST 262     04,2612  26 144 1           ADS    MPAC
1162  REF  26 LAST 259     04,2613  3 7762 0           CAF    TWO            SET MULTIPLIER TO .45
1163  REF   2 LAST 262     04,2614  0 2574 0           TC     DEGOUTSF +1

1164  REF  98 LAST 262     04,2615  56 144 0  NEGOPT   XCH    MPAC           NEGATIVE CASE
1165  REF   2 LAST 262     04,2616  6 2657 1           AD     90BIAS
1166  REF 159 LAST 261     04,2617  10 000 0           CCS    A
1167  REF   1              04,2620  0 2607 1           TC     BIASCOM        IF POS THEN SUBTRACT 1 BECAUSE OF 2SCOM
1168  REF   4 LAST 260     04,2621  0 4736 1           TC     CCSHOLE
1169  REF  51 LAST 260     04,2622  6 7763 1           AD     ONE            IF NEG RESTORE SUM
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```
1170                                  04,2623  4 0000 0          COM                    IF NEG 0 LEAVE NEG 0
1171  REF   2 LAST 262               04,2624  0 2607 1          TC      BIASCOM

1172                                  04,2625  0 0006 1  SETAUG   EXTEND
1173  REF  99 LAST 262               04,2626  5 0146 1          INDEX   MPAC    +2     LOADS SFTEMP1 AND SFTEMP2 WITH THE
1174  REF   1                        04,2627  3 2654 1          DCA     DEGTAB         DP AUGMENTER CONSTANT
1175  REF   4 LAST 261               04,2630  52 114 1          DXCH    SFTEMP1
1176  REF  92 LAST 260               04,2631  0 0002 0          TC      Q

1177  REF 100 LAST 263               04,2632  10 144 1  FIXRANGE CCS     MPAC           IF MPAC IS + RETURN TO L+1
1178  REF  93 LAST 263               04,2633  0 0002 0          TC      Q              IF MPAC IS - RETURN TO L+2 AFTER
1179  REF  94 LAST 263               04,2634  0 0002 0          TC      Q              MASKING OUT THE SIGN BIT
1180                                  04,2635  1 2636 1          TCF     +1
1181  REF  19 LAST 262               04,2636  4 7745 1          CS      BIT15
1182  REF 101 LAST 263               04,2637  7 0144 1          MASK    MPAC
1183  REF 102 LAST 263               04,2640  54 144 1          TS      MPAC
1184  REF  95 LAST 263               04,2641  50 002 0          INDEX   Q
1185                                  04,2642  0 0001 0          TC      1

1186                                  04,2643  0 0006 1  DEGCOM   EXTEND
1187  REF 103 LAST 263               04,2644  5 0146 1          INDEX   MPAC    +2     LOADS MULTIPLIER , DOES SHORTMP, AND
1188  REF   2 LAST 263               04,2645  3 2654 1          DCA     DEGTAB         ADDS AUGMENTER.
1189  REF 104 LAST 263               04,2646  52 145 0          DXCH    MPAC           ADJUSTED ANGLE IN A
1190  REF   2 LAST 242               04,2647  0 7357 1          TC      SHORTMP
1191  REF   5 LAST 263               04,2650  52 114 1          DXCH    SFTEMP1
1192  REF 105 LAST 263               04,2651  20 145 0          DAS     MPAC
1193  REF   1                        04,2652  0 2663 0          TC      SCOJTEND


1194                                  04,2653   05605 1  DEGTAB   DCT     05605          HI PART OF     .18
1195                                  04,2654   03656 1           DCT     03656          LOW PART OF    .18
1196                                  04,2655   16314 0           DCT     16314          HI PART OF     .45
1197                                  04,2656   31463 1           DCT     31463          LO PART OF     .45

1198                                  04,2657   16040 1  20BIAS   DCT     16040          20 DEG BIAS FOR OPTICS

1199  REF   6 LAST 263               04,2660  52 114 1  ARTOUTSF DXCH    SFTEMP1        ASSUMES POINT AT LEFT OF DP SPCON
1200  REF 106 LAST 263               04,2661  52 145 0          DXCH    MPAC
1201  REF   3 LAST 263               04,2662  0 7357 1          TC      SHORTMP
1202  REF  17 LAST 256               04,2663  0 5225 1  SCOUTEND TC      POSTJUMP
1203  REF   2 LAST 262               04,2664   12513 0          CADR    DSPOCEND

1204  REF   1                        04,2665  0 2677 0  DP1OUTSF TC      DPOUT
1205  REF 107 LAST 263               04,2666  56 146 1          XCH     MPAC    +2     SCALES MPAC, MPAC +1 BY DP SCALE FACTOR
1206  REF 108 LAST 263               04,2667  56 145 1          XCH     MPAC    +1     IN SFTEMP1, SFTEMP2.  THEN SCALE RESULT
1207  REF 109 LAST 263               04,2670  54 144 1          TS      MPAC           BY B14.
1208  REF   2 LAST 263               04,2671  0 2663 0          TC      SCOJTEND
```

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```
1209  REF   2 LAST 263     04,2672  0 2677 0  DP2OUTSF TC     DPOUT          SCALES MPAC , MPAC +1 BY DP SCALE FACTOR
1210  REF   3 LAST 263     04,2673  0 2663 0           TC     SCOUTEND

1211  REF   3 LAST 264     04,2674  0 2677 0  DP3OUTSF TC     DPOUT          ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
1212  REF   1               04,2675  0 3072 1           TC     TPLEFT7        PART OF SECON. SHIFTS RESULTS LEFT 7.
1213  REF   4 LAST 264     04,2676  0 2663 0           TC     SCOUTEND

R1214 DPOUT PICKS UP FRESH DATA FOR BOTH HI AND LO COMPONENTS.
R1215 THIS IS NEEDED FOR TIME DISPLAY.

1216  REF  96 LAST 263     04,2677  56 002 0  DPOUT    XCH    Q
1217  REF   1               04,2700  54 111 1           TS     OVFIND
1218  REF   6 LAST 261     04,2701  50 130 0           INDEX  MIXBR
1219                        04,2702  0 2702 0           TC     +0
1220  REF   1               04,2703  0 2720 0           TC     DPOUTNOR
1221  REF   9 LAST 261     04,2704  50 107 1           INDEX  DECOUNT        GET IDADDTAB ENTRY FOR COMPONENT <
1222  REF   2 LAST 254     04,2705  3 0140 1           CA     IDADITEM           OF NOUN.
1223  REF   5 LAST 254     04,2706  7 4563 1           MASK   LOW11          E SUBK
1224  REF   2 LAST 254     04,2707  0 4523 1           TC     SETEBANK       SET EB, LEAVE EADRES IN A.
1225                        04,2710  0 0006 1  DPOUTCOM EXTEND
1226  REF 150 LAST 262     04,2711  5 0000 1           INDEX  A              MIXED          NORMAL
1227                        04,2712  3 0001 0           DCA    0              C(ESUBK)       C(E)
1228  REF 110 LAST 263     04,2713  52 145 0           DXCH   MPAC           C((E SUBK)+1)      C(E+1)
1229  REF   3 LAST 209     04,2714  0 7327 0           TC     TPAGREE
1230  REF   2 LAST 242     04,2715  0 7155 1           TC     DMP
1231  REF   7 LAST 263     04,2716   00113 1           ADRES  SFTEMP1
1232  REF   2 LAST 264     04,2717  0 0111 0           TC     OVFIND

1233  REF  10 LAST 261     04,2720  3 0135 0  DPOUTNOR CA     NOUNADD        E
1234  REF   1               04,2721  0 2710 0           TC     DPOUTCOM

R1235 THIS IS A SPECIAL PURPOSE VERB FOR DISPLAYING A DOUBLE PRECISION AGC
R1236 WORD AS 10 DECIMAL DIGITS ON THE AGC DISPLAY PANEL.  IT CAN BE USED WITH
R1237 ANY NOUN, EXCEPT MIXED NOUNS. IT DISPLAYS THE CONTENTS
R1238 OF THE REGISTER NOUNADD IS POINTING TO .  IF USED WITH NOUNS WHICH ARE
R1239 INHERENTLY NOT DP SUCH AS THE CDU COUNTERS THE DISPLAY WILL BE GARBAGE.
R1240 DISPLAY IS IN R1 AND R2 ONLY WITH THE SIGN IN R1.

1241  REF   7 LAST 264     04,2722  50 130 0  DSPDPDEC INDEX  MIXBR
1242                        04,2723  0 2723 0           TC     +0
1243                        04,2724  0 2726 0           TC     +2             NORMAL NOUN
1244  REF   4 LAST 262     04,2725  0 3315 0           TC     DSPALARM
```

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```
1245                          04,2726  0 0006 1           EXTEND
1246  REF  11 LAST 264        04,2727  5 0135 0           INDEX   NOJNADD
1247                          04,2730  3 0001 0           DCA     0
1248  REF 111 LAST 264        04,2731  52 145 0           DXCH    MPAC
1249  REF   6 LAST 261        04,2732  3 4527 0           CAF     R1D1
1250  REF  26 LAST 261        04,2733  54 270 0           TS      DSPCOUNT
1251  REF  59 LAST 262        04,2734  3 7767 0           CAF     ZERO
1252  REF 112 LAST 265        04,2735  54 146 0           TS      MPAC  +2
1253  REF   4 LAST 264        04,2736  0 7327 0           TC      TPAGREE
1254  REF   1                 04,2737  0 3173 1           TC      DSP2DEC
1255  REF   6 LAST 261        04,2740  0 0126 1 ENDDPDEC  TC      ENTEXIT
```

```
1257  REF   1                          05,2535                SETLOC  ENDRTOUT

1258  REF  27 LAST 262   05,2535  4 7762 1  ABCLOAD  CS      TWO
1259  REF   5 LAST 259   05,2536  0 2376 1           TC      COMPTEST
1260  REF   1            05,2537  3 2673 1           CAF     VBSP1LD
1261  REF   2 LAST 247   05,2540  0 2314 0           TC      JPDATVB  -1
1262  REF   1            05,2541  0 2252 0           TC      REQDATX
1263  REF   1            05,2542  3 2674 0           CAF     VBSP2LD
1264  REF   3 LAST 266   05,2543  0 2314 0           TC      JPDATVB  -1
1265  REF   1            05,2544  0 2254 0           TC      REQDATY
1266  REF   1            05,2545  3 2675 1           CAF     VBSP3LD
1267  REF   4 LAST 266   05,2546  0 2314 0           TC      JPDATVB  -1
1268  REF   2 LAST 251   05,2547  0 2256 1           TC      REQDATZ


1269  REF   7 LAST 254   05,2550  4 6306 0  PJTXYZ  CS      SIX        TEST THAT THE 3 DATA WORDS LOADED ARE
1270  REF   1            05,2551  0 2676 1           TC      ALLDC/OC   ALL DEC OR ALL OCT.
1271                     05,2552  0 0006 1           EXTEND
1272  REF   4 LAST 255   05,2553  3 2076 1           DCA     CODNNLOC   SWITCH BANKS TO NOUN TABLE READING
1273  REF   6 LAST 261   05,2554  52 006 0           DXCH    Z          ROUTINE.
1274  REF  70 LAST 265   05,2555  3 7767 0           CAF     ZERO       X COMP
1275  REF   1            05,2556  0 2762 0           TC      PUTCOM
1276  REF  12 LAST 265   05,2557  50 135 0           INDEX   NOUNADD
1277                     05,2560  54 000 0           TS      0
1278  REF  52 LAST 262   05,2561  3 7763 1           CAF     ONE        Y COMP
1279  REF   2 LAST 266   05,2562  0 2762 0           TC      PUTCOM
1280  REF  13 LAST 266   05,2563  50 135 0           INDEX   NOUNADD
1281                     05,2564  54 001 1           TS      1
1282  REF  28 LAST 266   05,2565  3 7762 0           CAF     TWO        Z COMP
1283  REF   3 LAST 266   05,2566  0 2762 0           TC      PUTCOM
1284  REF  14 LAST 266   05,2567  50 135 0           INDEX   NOUNADD
1285                     05,2570  54 002 1           TS      2
1286  REF   2 LAST 250   05,2571  0 2663 0           TC      LOADIV

1287  REF  53 LAST 266   05,2572  4 7763 0  ABLOAD  CS      ONE
1288  REF   6 LAST 266   05,2573  0 2376 1           TC      COMPTEST
1289  REF   2 LAST 266   05,2574  3 2673 1           CAF     VBSP1LD
1290  REF   5 LAST 266   05,2575  0 2314 0           TC      JPDATVB  -1
1291  REF   2 LAST 266   05,2576  0 2252 0           TC      REQDATX
1292  REF   2 LAST 266   05,2577  3 2674 0           CAF     VBSP2LD
1293  REF   6 LAST 266   05,2600  0 2314 0           TC      JPDATVB  -1
1294  REF   2 LAST 266   05,2601  0 2254 0           TC      REQDATY
1295  REF   3 LAST 214   05,2602  4 7766 0  PJTXY   CS      FIVE       TEST THAT THE 2 DATA WORDS LOADED ARE
1296  REF   2 LAST 266   05,2603  0 2676 1           TC      ALLDC/OC   ALL DEC OR ALL OCT.
1297                     05,2604  0 0006 1           EXTEND
```

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```
1298  REF   5 LAST 266   05,2605  3 2076 1          DCA   LODNNLOC    SWITCH BANKS TO NOUN TABLE READING
1299  REF   7 LAST 266   05,2606  52 006 0          DXCH  Z           ROUTINE.
1300  REF  71 LAST 266   05,2607  3 7767 0          CAF   ZERO        X COMP
1301  REF   4 LAST 266   05,2610  0 2762 0          TC    PUTCOM
1302  REF  15 LAST 266   05,2611  50 135 0          INDEX NOUNADD
1303                     05,2612  54 000 0          TS    0
1304  REF  54 LAST 266   05,2613  3 7763 1          CAF   ONE         Y COMP
1305  REF   5 LAST 267   05,2614  0 2762 0          TC    PUTCOM
1306  REF  16 LAST 267   05,2615  50 135 0          INDEX NOUNADD
1307                     05,2616  54 001 1          TS    1
1308  REF   3 LAST 266   05,2617  0 2663 0          TC    LOADIV

1309  REF   3 LAST 266   05,2620  0 2252 0  ALOAD   TC    READDATX
1310                     05,2621  0 0006 1          EXTEND
1311  REF   6 LAST 267   05,2622  3 2076 1          DCA   LODNNLOC    SWITCH BANKS TO NOUN TABLE READING
1312  REF   8 LAST 267   05,2623  52 006 0          DXCH  Z           ROUTINE.
1313  REF  72 LAST 267   05,2624  3 7767 0          CAF   ZERO        X COMP
1314  REF   6 LAST 267   05,2625  0 2762 0          TC    PUTCOM
1315  REF  17 LAST 267   05,2626  50 135 0          INDEX NOUNADD
1316                     05,2627  54 000 0          TS    0
1317  REF   4 LAST 267   05,2630  0 2663 0          TC    LOADLV

1318  REF  55 LAST 267   05,2631  4 7763 0  BLOAD   CS    ONE
1319  REF   7 LAST 266   05,2632  0 2376 1          TC    COMPTEST
1320  REF  20 LAST 263   05,2633  3 7745 0          CAF   BIT15       SET CLPASS FOR PASS0 ONLY
1321  REF  10 LAST 251   05,2634  54 306 0          TS    CLPASS
1322  REF   3 LAST 266   05,2635  0 2254 0          TC    READDATY
1323                     05,2636  0 0006 1          EXTEND
1324  REF   7 LAST 267   05,2637  3 2076 1          DCA   LODNNLOC    SWITCH BANKS TO NOUN TABLE READING
1325  REF   9 LAST 267   05,2640  52 006 0          DXCH  Z           ROUTINE.
1326  REF  56 LAST 267   05,2641  3 7763 1          CAF   ONE
1327  REF   7 LAST 267   05,2642  0 2762 0          TC    PUTCOM
1328  REF  18 LAST 267   05,2643  50 135 0          INDEX NOUNADD
1329                     05,2644  54 001 1          TS    1
1330  REF   5 LAST 267   05,2645  0 2663 0          TC    LOADLV

1331  REF  29 LAST 266   05,2646  4 7762 1  CLOAD   CS    TWO
1332  REF   8 LAST 267   05,2647  0 2376 1          TC    COMPTEST
1333  REF  21 LAST 267   05,2650  3 7745 0          CAF   BIT15       SET CLPASS FOR PASS0 ONLY
1334  REF  11 LAST 267   05,2651  54 306 0          TS    CLPASS
1335  REF   3 LAST 266   05,2652  0 2256 1          TC    READDATZ
1336                     05,2653  0 0006 1          EXTEND
1337  REF   8 LAST 267   05,2654  3 2076 1          DCA   LODNNLOC    SWITCH BANKS TO NOUN TABLE READING
1338  REF  10 LAST 267   05,2655  52 006 0          DXCH  Z           ROUTINE.
1339  REF  30 LAST 267   05,2656  3 7762 0          CAF   TWO
1340  REF   8 LAST 267   05,2657  0 2762 0          TC    PUTCOM
1341  REF  19 LAST 267   05,2660  50 135 0          INDEX NOUNADD
1342                     05,2661  54 002 1          TS    2
1343  REF   6 LAST 267   05,2662  0 2663 0          TC    LOADLV
```

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```
1344   REF  73 LAST 267    05,2663  3 7767 0  LOADLV   CAF    ZERO
1345   REF  13 LAST 251    05,2664  54 271 1           TS     DECBRNCH
1346   REF  74 LAST 268    05,2665  4 7767 1           CS     ZERO
1347   REF   1             05,2666  54 305 0           TS     LOADSTAT
1348   REF   4 LAST 256    05,2667  4 4565 1           CS     VD1        TO BLOCK NUMERICAL CHARACTERS AND
1349   REF  27 LAST 265    05,2670  54 270 0           TS     DSPCOUNT   CLEARS AFTER A COMPLETED LOAD
1350   REF  18 LAST 263    05,2671  0 5225 1           TC     POSTJUMP   AFTER COMPLETED LOAD, GO TO RECALTST
1351   REF   1             05,2672  11440 1            CADR   RECALTST   TO SEE IF THERE IS RECALL FROM ENDIDLE.

1352                       05,2673  00021 1  V35P1LD   OCT    21         VB21 = ALOAD
1353                       05,2674  00022 1  V35P2LD   OCT    22         VB22 = BLOAD
1354                       05,2675  00023 0  V35P3LD   OCT    23         VB23 = CLOAD


1355   REF  10 LAST 264    05,2676  54 107 0  ALLDC/OC TS     DECOUNT    TESTS THAT DATA WORDS LOADED ARE EITHER
1356   REF  14 LAST 268    05,2677  4 0271 1           CS     DECBRNCH   ALL DEC OR ALL OCT. ALARMS IF NOT.
1357   REF  12 LAST 249    05,2700  54 021 0           TS     SR
1358   REF  13 LAST 268    05,2701  4 0021 0           CS     SR
1359   REF  14 LAST 268    05,2702  4 0021 0           CS     SR         SHIFTED RIGHT 2
1360   REF 151 LAST 264    05,2703  10 000 0           CCS    A          DEC COMP BITS IN LOW 3
1361                       05,2704  1 2706 0           TCF    +2         SOME ONES IN LOW 3
1362   REF  97 LAST 264    05,2705  0 0002 0           TC     Q          ALL ZEROS, ALL OCTAL.  OK
1363   REF  11 LAST 268    05,2706  6 0107 1           AD     DECOUNT    DEC COMP = 7 FOR 3COMP, =6 FOR 2COMP
1364                       05,2707  0 0006 1           EXTEND            (BUT IT HAS BEEN DECREMENTED BY CCS)
1365                       05,2710  1 2712 0           BZF    +2         MUST MATCH 6 FOR 3COMP, 5 FOR 2COMP.
1366   REF  10 LAST 260    05,2711  0 2324 0           TC     GODSPALM
1367   REF  98 LAST 268    05,2712  0 0002 0  GOQ      TC     Q          ALL REQUIRED ARE DEC, OK


1368   REF  99 LAST 268    05,2713  56 002 0  SFRUTNOR XCH    Q          GETS SF ROUTINE NUMBER FOR NORMAL CASE
1369   REF   1             05,2714  54 104 0           TS     EXITEM     CANT USE L FOR RETURN, TSTFORDP USES L.
1370   REF   1             05,2715  3 4557 1           CAF    MID5
1371   REF   2 LAST 260    05,2716  7 0137 0           MASK   NNTYPTEM
1372   REF   1             05,2717  0 4532 1           TC     RIGHT5
1373   REF   2 LAST 268    05,2720  0 0104 1           TC     EXITEM     SF ROUTINE NUMBER IN A

1374   REF 100 LAST 268    05,2721  56 002 0  SFRUTMIX XCH    Q          GETS SF ROUTINE NUMBER FOR MIXED CASE
1375   REF   3 LAST 268    05,2722  54 104 0           TS     EXITEM
1376   REF  12 LAST 268    05,2723  50 107 1           INDEX  DECOUNT
1377   REF   1             05,2724  3 2753 1           CAF    DISPLACE   PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
1378   REF  56 LAST 260    05,2725  54 001 1           TS     L
1379   REF  13 LAST 268    05,2726  50 107 1           INDEX  DECOUNT
1380   REF   6 LAST 241    05,2727  3 4556 0           CAF    LOW5       LOW5, MID5, OR HI5 IN A
1381   REF   1             05,2730  7 0143 0           MASK   RUTMXTEM   GET HI5, MID5, OR LOW5 OF RUTMXTAB ENTRY
1382   REF  57 LAST 268    05,2731  50 001 0           INDEX  L
1383                       05,2732  0 0000 1           TC     0
R1384  DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
1385   REF   4 LAST 268    05,2733  0 0104 1  SFRET1   TC     EXITEM     SF ROUTINE NUMBER IN A
```

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```
1386  REF 101 LAST 268   05,2734  56 002 0  SFCONUM  XCH   Q          GETS 2X( SF CONSTANT NUMBER)
1387  REF   5 LAST 268   05,2735  54 104 0            TS    EXITEM
1388  REF   8 LAST 264   05,2736  50 130 0            INDEX MIXBR
1389                     05,2737  0 2737 0            TC    +0
1390  REF   1            05,2740  0 2756 1            TC    CONJMNOR   NORMAL NOUN
1391  REF  14 LAST 268   05,2741  50 107 1            INDEX DECOUNT    MIXED NOUN
1392  REF   2 LAST 268   05,2742  3 2753 1            CAF   DISPLACE
1393  REF  58 LAST 268   05,2743  54 001 1            TS    L          PUT TC GOQ, TC RIGHT5, OR TC LEFT5 IN L
1394  REF  15 LAST 269   05,2744  50 107 1            INDEX DECOUNT
1395  REF   7 LAST 268   05,2745  3 4556 0            CAF   LOW5
1396  REF   3 LAST 268   05,2746  7 0137 0            MASK  NNTYPTEM
1397  REF  59 LAST 269   05,2747  50 001 0            INDEX L
1398                     05,2750  0 0000 1            TC    0
R1399 DO TC GOQ(DECOUNT=0), DO TC RIGHT5(DECOUNT=1), DO TC LEFT5(DECOUNT=2).
1400                     05,2751  6 0000 1  SFRET     DOUBLE               2X(SF CONSTANT NUMBER ) IN A
1401  REF   6 LAST 269   05,2752  0 0104 1            TC    EXITEM

1402  REF   1            05,2753  0 2712 1  DISPLACE TC    GOQ
1403  REF   2 LAST 268   05,2754  0 4532 1            TC    RIGHT5
1404  REF   3 LAST 260   05,2755  0 4541 0            TC    LEFT5

1405  REF   8 LAST 269   05,2756  3 4556 0  CONUMNOR  CAF   LOW5       NORMAL NOUN ALWAYS GETS LOW 5 OF
1406  REF   4 LAST 269   05,2757  7 0137 0            MASK  NNTYPTEM   NNTYPTAB FOR SF CONUM.
1407                     05,2760  6 0000 1            DOUBLE
1408  REF   7 LAST 269   05,2761  0 0104 1            TC    EXITEM     2X( SF CONSTANT NUMBER) IN A



1409  REF  16 LAST 269   05,2762  54 107 0  PUTCOM   TS    DECOUNT
1410  REF 102 LAST 269   05,2763  56 002 0            XCH   Q
1411  REF   1            05,2764  54 105 1            TS    DECRET
1412  REF  75 LAST 268   05,2765  3 7767 0            CAF   ZERO
1413  REF   3 LAST 264   05,2766  54 111 1            TS    OVFIND
1414  REF  17 LAST 269   05,2767  50 107 1            INDEX DECOUNT
1415  REF   3 LAST 248   05,2770  56 277 0            XCH   XREGLP
1416  REF 113 LAST 265   05,2771  54 145 0            TS    MPAC +1
1417  REF  18 LAST 269   05,2772  50 107 1            INDEX DECOUNT
1418  REF   3 LAST 261   05,2773  56 274 0            XCH   XREG
1419  REF 114 LAST 269   05,2774  54 144 1            TS    MPAC
1420  REF   9 LAST 269   05,2775  50 130 0            INDEX MIXBR
1421                     05,2776  0 2776 0            TC    +0
1422  REF   1            05,2777  0 3023 0            TC    PUTNORM    NORMAL NOUN
R1423 IF MIXNOUN, PLACE ADDRESS FOR COMPONENT K INTO NOUNADD, SET EBANK BITS.
1424  REF  19 LAST 269   05,3000  50 107 1            INDEX DECOUNT    GET IDADDTAB ENTRY FOR COMPONENT K
1425  REF   3 LAST 264   05,3001  3 0140 1            CA    IDADDTEM         OF NOUN.
1426  REF   6 LAST 264   05,3002  7 4563 1            MASK  LOW11      (ECADR)SUBK FOR CURRENT COMP OF NOUN
1427  REF   5 LAST 255   05,3003  0 4513 1            TC    SETNCADR   ECADR INTO NOUNCADR. SETS EB, NOUNADD.
1428                     05,3004  0 0006 1            EXTEND           C(NOUNADD) IN A UPON RETURN
1429  REF  20 LAST 269   05,3005  60 107 1            SU    DECOUNT    PLACE (ESUBK)-K INTO NOUNADD
1430  REF  20 LAST 267   05,3006  54 135 1            TS    NOUNADD
```

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```
 1431   REF  15 LAST 268      05,3007  10 271 1            CCS    DEC3RNCH
 1432   REF   1              05,3010  0 3051 0            TC     PUTDECSF        +- DEC
 1433   REF   3 LAST 261     05,3011  0 2721 1            TC     SFRJTMIX        +0  OCTAL
 1434   REF   3 LAST 260     05,3012  0 2236 1            TC     DPTEST
 1435   REF   1              05,3013  0 3040 0            TC     PUTCOM2         NO DP
A1436                                                              TEST FOR DP SCALE FOR OCT LOAD. IF SO,
A1437                                                              +0 INTO MAJOR PART. SET NOUNADD FOR
A1438                                                              LOADING OCTAL WORD INTO MINOR PART.
 1439   REF  21 LAST 269      05,3014  24 135 0  PUTDPCOM INCR   NOUNADD        DP  (ESUBK)=K+1  OR  E+1
 1440   REF  22 LAST 270      05,3015  3 0135 0            CA     NOUNADD         NOUNADD NOW SET FOR MINOR PART
 1441   REF  21 LAST 269      05,3016  26 107 0            ADS    DECOUNT         (ESUBK)+1  OR  E+1  INTO DECOUNT
 1442   REF  76 LAST 269      05,3017  3 7767 0            CAF    ZERO            NOUNADD SET FOR MINOR PART
 1443   REF  22 LAST 270      05,3020  50 107 1            INDEX  DECOUNT
 1444                        05,3021  53'777 0            TS     0        -1     ZERO MAJOR PART(ESUBK OR E)
 1445   REF   2 LAST 270      05,3022  0 3040 0            TC     PUTCOM2

 1446   REF   2 LAST 251      05,3023  0 4521 0  PUTNORM   TC     SETNADD         ECADR FROM NOUNCADR, SETS EB, NOUNADD.
 1447   REF  16 LAST 270      05,3024  10 271 1            CCS    DEC3RNCH
 1448   REF   2 LAST 270      05,3025  0 3051 0            TC     PUTDECSF        +  DEC
 1449   REF   3 LAST 261      05,3026  0 2713 0            TC     SFRJTNOR        +0  OCTAL
 1450   REF   4 LAST 270      05,3027  0 2236 1            TC     DPTEST
 1451   REF   3 LAST 270      05,3030  0 3034 0            TC     PUTCOM2 -4      NO DP
 1452   REF  77 LAST 270      05,3031  3 7767 0            CAF    ZERO            DP
 1453   REF  23 LAST 270      05,3032  54 107 0            TS     DECOUNT
 1454   REF   1              05,3033  0 3014 1            TC     PUTDPCOM

 1455   REF   6 LAST 260      05,3034  3 0136 0            CA     NNADTEM
 1456   REF  57 LAST 267      05,3035  6 7763 1            AD     ONE             IF NNADTEM = -1, CHANNEL TO BE SPECIFIED
 1457                        05,3036  0 0006 1            EXTEND
 1458   REF   1              05,3037  1 3044 0            BZF    CHANLOAD
 1459   REF 115 LAST 269      05,3040  56 144 0  PUTCOM2   XCH    MPAC
 1460   REF   2 LAST 269      05,3041  0 0105 0            TC     DECRET

 1461   REF  28 LAST 268                   E0             EBANK= DSPCOUNT
 1462                        05,3042    02045 1  GTSFINLC 2CADR  GTSFIN
C1462   REF   1              05,3043    46060 0

 1463   REF 116 LAST 270      05,3044  56 144 0  CHANLOAD  XCH    MPAC
 1464                        05,3045  0 0006 1            EXTEND
 1465   REF   4 LAST 260      05,3046  5 0310 0            INDEX  NOUNCADR
 1466                        05,3047  01 000 0            WRITE  0
 1467   REF   7 LAST 267      05,3050  0 2663 0            TC     LOADCV


R1468   PUTDECSF FINDS MIXBR AND DECOUNT STILL SET FROM PUTCOM

 1469   REF   2 LAST 261      05,3051  0 2734 0  PUTDECSF TC     SFCONUM         2X(SF CON NUMB) IN A
 1470   REF   8 LAST 264      05,3052  54 113 0            TS     SFTEMP1
```

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```
1471                        05,3053  0 0006 1          EXTEND          SWITCH BANKS TO SF CONSTANT TABLE
1472  REF   1               05,3054  3 3043 0          DCA     GTSFTNLC READING ROUTINE.
1473  REF  11 LAST 267      05,3055  52 006 0          DXCH    Z       LOADS SFTEMP1, SFTEMP2.
1474  REF  10 LAST 269      05,3056  50 130 0          INDEX   MIXBR
1475                        05,3057  0 3057 0          TC      +0
1476  REF   1               05,3060  0 3063 1          TC      PUTSFNOR
1477  REF   4 LAST 270      05,3061  0 2721 1          TC      SFRJTMIX
1478  REF   1               05,3062  0 3064 0          TC      PUTDCSF2
1479  REF   4 LAST 270      05,3063  0 2713 0  PJTSFNOR TC      SFRJTNOR

1480  REF 152 LAST 268      05,3064  50 000 1  PJTDCSF2 INDEX   A
1481  REF   1               05,3065  3 3067 0          CAF     SFINTABR
1482  REF   8 LAST 261      05,3066  0 5230 0          TC      BANKJUMP        SWITCH BANKS FOR EXPANSHION ROOM
1483  REF   5 LAST 264      05,3067  11315 0  SFINTABR CADR    DSPALARM        ALARM IF DEC LOAD WITH OCTAL ONLY NOUN
1484  REF   1               05,3070  11021 1          CADR    BINROUND
1485  REF   1               05,3071  10741 1          CADR    DEGINSF
1486  REF   1               05,3072  11011 1          CADR    ARTHINSF
1487  REF   1               05,3073  11041 1          CADR    DPINSF
1488  REF   1               05,3074  11066 1          CADR    DPINSF2
1489  REF   1               05,3075  11024 1          CADR    DPTDEGIN
1490  REF   2 LAST 271      05,3076  11041 1          CADR    DPINSF          SAME AS ARITHDP1
1491                        05,3077  ENDRUTIN EQUALS
```

```
R1492  SCALE FACTORS FOR THOSE ROUTINES NEEDING THEM ARE AVAILABLE IN SFTEMP1.
R1493  ALL SFIN ROUTINES USE MPAC MPAC+1. LEAVE RESULT IN A, END WITH TC DECRET
```

```
1494  REF   1                     04,2741          SETLOC ENDDPDEC +1

R1495  DEGINSF APPLIES 1000/180 =5.55555(10) = 5.43434(8)

1496  REF   3 LAST 264      04,2741  0 7155 1  DEGINSF  TC      DMP             SF ROUTINE FOR DEC DEGREES
1497  REF   1               04,2742  03004 0           ADRES   DEGCON1         MULT BY 5.5  5(10)X2EXP-3
1498  REF 117 LAST 270      04,2743  10 145 0          CCS     MPAC    +1      THIS ROUNDS OFF MPAC+1 BEFORE SHIFT
1499  REF  18 LAST 244      04,2744  3 7751 0          CAF     BIT11           LEFT 3, AND CAUSES 360.00 TO OF/UF
1500                        04,2745  0 2747 1          TC      +2              WHEN SHIFTED LEFT AND ALARM.
1501  REF  19 LAST 271      04,2746  4 7751 1          CS      BIT11
1502  REF 118 LAST 271      04,2747  6 0145 1          AD      MPAC    +1
1503  REF   1               04,2750  0 3104 1          TC      2ROUND  +2
1504  REF   1               04,2751  0 4611 0          TC      TPSL1           LEFT 1
1505  REF   2 LAST 271      04,2752  0 4611 0  DEGINSF2 TC      TPSL1           LEFT 2
1506  REF   1               04,2753  0 3113 1          TC      TESTOFUF
1507  REF   3 LAST 271      04,2754  0 4611 0          TC      TPSL1           RETURNS IF NO OF/UF (LEFT3)
1508  REF 119 LAST 271      04,2755  10 144 1          CCS     MPAC
1509  REF   1               04,2756  0 2762 0          TC      SIGNFIX         IF+, GO TO SIGNFIX
1510  REF   2 LAST 271      04,2757  0 2762 0          TC      SIGNFIX         IF +0, GO TO SIGNFIX
1511                        04,2760  4 0000 0          COM                     IF - , USE -MAGNITUDE +1
```

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```
1512  REF 120 LAST 271   04,2761  54 144 1          TS    MPAC          IF -0, USE +0
1513  REF   4 LAST 269   04,2762  10 111 1 SIGNFIX  CCS   OVFIND
1514  REF   1            04,2763  0 3000 1          TC    SGNTO1        IF OVERFLOW
1515  REF   1            04,2764  0 2774 1          TC    ENDSCALE      NO OVERFLOW/UNDERFLOW
1516  REF 121 LAST 272   04,2765  10 144 1          CCS   MPAC          IF UF FORCE SIGN TO 0 EXCEPT -180
1517  REF   5 LAST 262   04,2766  0 4736 1          TC    CCSHOLE
1518  REF   1            04,2767  0 2776 0          TC    NEG180
1519                     04,2770  0 2771 1          TC    +1
1520  REF 122 LAST 272   04,2771  56 144 0          XCH   MPAC
1521  REF   9 LAST 191   04,2772  7 7743 1          MASK  POSMAX
1522  REF 123 LAST 272   04,2773  54 144 1          TS    MPAC
1523  REF  19 LAST 268   04,2774  0 5225 1 ENDSCALE TC    POSTJUMP
1524  REF   4 LAST 270   04,2775   13040 1          CADR  PUTCOM2

1525  REF  10 LAST 272   04,2776  4 7743 1 NEG180   CS    POSMAX
1526  REF   2 LAST 272   04,2777  0 2773 0          TC    ENDSCALE  -1

1527  REF 124 LAST 272   04,3000  4 0144 1 SGNTO1   CS    MPAC          IF OF FORCE SIGN TO 1
1528  REF  11 LAST 272   04,3001  7 7743 1          MASK  POSMAX
1529  REF 153 LAST 271   04,3002  4 0000 0          CS    A
1530  REF   3 LAST 272   04,3003  0 2773 0          TC    ENDSCALE  -1

1531                     04,3004   26161 0 DEGCON1  2DEC  5.555555555 B-3
C1531                    04,3005   30707 1
1532                     04,3006   21616 0 DEGCON2  2DEC  2.222222222 B-2
C1532                    04,3007   07071 0
1533                     04,3010   71527 1 NEG.2    OCT   -06250        = .197753906  I.E. THE BIAS SCALED

1534  REF   4 LAST 271   04,3011  0 7155 1 ARTHINSF TC    DMP           SCALES MPAC, +1 BY SFTEMP1, SFTEMP2,
1535  REF   9 LAST 270   04,3012   00113 1          ADRES SFTEMP1       ASSUMES POINT BETWEEN HI AND LO PARTS
1536  REF 125 LAST 272   04,3013  56 146 1          XCH   MPAC    +2    OF SFCON, SHIFTS RESULTS LEFT BY 14,
1537  REF 126 LAST 272   04,3014  56 145 1          XCH   MPAC    +1    (BY TAKING RESULTS FROM MPAC+1, MPAC+2)
1538  REF 127 LAST 272   04,3015  56 144 0          XCH   MPAC
1539                     04,3016  0 0006 1          EXTEND
1540  REF   2 LAST 271   04,3017  1 3021 0          BZF   BINROUND
1541  REF   6 LAST 271   04,3020  0 3315 0          TC    DSPALARM      TOO LARGE A LOAD
1542  REF   2 LAST 271   04,3021  0 3102 1 BINROUND TC    2ROUND
1543  REF   2 LAST 271   04,3022  0 3113 1          TC    TESTOFUF
1544  REF   4 LAST 272   04,3023  0 2774 1          TC    ENDSCALE      RETURNS IF NO OF/UF


1545  REF 128 LAST 272   04,3024  10 144 1 OPTDEGIN CCS   MPAC          OPTICS SCALING ROUTINE
1546                     04,3025  0 3031 0          TC    +4
1547                     04,3026  0 3031 0          TC    +3
1548  REF   7 LAST 272   04,3027  0 3315 0          TC    DSPALARM      REJECT NEGATIVE INPUT
1549  REF   8 LAST 272   04,3030  0 3315 0          TC    DSPALARM            DITTO
1550  REF   1            04,3031  3 3010 0 OPDEGIN2 CAF   NEG.2         RANGE IS 90 DEG
1551  REF 129 LAST 272   04,3032  26 144 1          ADS   MPAC          SUBTRACT BIAS
1552  REF   5 LAST 272   04,3033  0 7155 1          TC    DMP           MULT BY 100 / 45  B-2
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L       PINBALL GAME BUTTONS AND LIGHTS                                 USER'S OWN PAGE NO.  42          53

1553    REF   1                 04,3034   03006 1          ADRES   DEGCON2
1554    REF  18 LAST 185        04,3035   3 7750 1         CAF     BIT12          ROUND AS IN DEGINSF
1555    REF 130 LAST 272        04,3036   6 0145 1         AD      MPAC    +1
1556    REF   3 LAST 272        04,3037   0 3104 1         TC      2ROUND  +2
1557    REF   1                 04,3040   0 2752 0         TC      DEGINSF2

1558    REF   6 LAST 272        04,3041   0 7155 1 DPINSF  TC      DMP            SCALES MPAC, MPAC +1 BY SFTEMP1,
1559    REF  10 LAST 272        04,3042    00113 1         ADRES   SFTEMP1        SFTEMP2.  STORES LOW PART OF RESULT
1560    REF 131 LAST 273        04,3043   56 146 1         XCH     MPAC    +2     IN (E SUBK) +1 OR E+1
1561                            04,3044   6 0000 1         DOUBLE
1562    REF 132 LAST 273        04,3045   54 146 0         TS      MPAC    +2
1563    REF  78 LAST 270        04,3046   3 7767 0         CAF     ZERO
1564    REF 133 LAST 273        04,3047   6 0145 1         AD      MPAC    +1
1565    REF   4 LAST 273        04,3050   0 3104 1         TC      2ROUND  +2
1566    REF   3 LAST 272        04,3051   0 3113 1         TC      TESTOFUF
1567    REF  11 LAST 271        04,3052   50 130 0         INDEX   MIXBR          RETURNS IF NO OF/UF
1568                            04,3053   0 3053 1         TC      +0
1569    REF   1                 04,3054   0 3064 0         TC      DPINORM
1570    REF  24 LAST 270        04,3055   3 0107 1         CA      DECOUNT        MIXEDNOUN
1571    REF  23 LAST 270        04,3056   6 0135 0 DPINCOM AD      NOUNADD            MIXED                NORMAL
1572    REF 103 LAST 269        04,3057   54 002 1         TS      Q                  E SUBK          E
1573    REF 134 LAST 273        04,3060   56 145 1         XCH     MPAC    +1
1574    REF 104 LAST 273        04,3061   50 002 0         INDEX   Q
1575                            04,3062   54 001 1         TS      1              PLACE LOW PART IN
1576    REF   5 LAST 272        04,3063   0 2774 1         TC      ENDSCALE       (E SUBK) +1    MIXED
1577    REF  79 LAST 273        04,3064   3 7767 0 DPINORM CAF     ZERO           E +1           NORMAL
1578    REF   1                 04,3065   0 3056 1         TC      DPINCOM

1579    REF   7 LAST 273        04,3066   0 7155 1 DPINSF2 TC      DMP            ASSUMES POINT BETWEEN BITS 7-8 OF HIGH
1580    REF  11 LAST 273        04,3067    00113 1         ADRES   SFTEMP1        PART OF SF CONST. DPINSF2 SHIFTS RESULTS
1581    REF   2 LAST 264        04,3070   0 3072 1         TC      TPLEFT7        LEFT BY 7, ROUNDS MPAC+2 INTO MPAC+1.
1582    REF   3 LAST 271        04,3071   0 3043 0         TC      DPINSF  +2

1583    REF 105 LAST 273        04,3072   56 002 0 TPLEFT7 XCH     Q              OPERATES ON MPAC, MPAC+1, MPAC+2
1584    REF   1                 04,3073   54 114 1         TS      SFTEMP2        CANT USE L FOR RETURN. TPSL1 USES L.
1585    REF   8 LAST 266        04,3074   3 6306 1         CAF     SIX            LEFT BY 7
1586    REF  12 LAST 273        04,3075   54 113 0 LEFT7COM TS     SFTEMP1
1587    REF   4 LAST 271        04,3076   0 4611 0         TC      TPSL1
1588    REF  13 LAST 273        04,3077   10 113 0         CCS     SFTEMP1
1589    REF   1                 04,3100   0 3075 0         TC      LEFT7COM
1590    REF   2 LAST 273        04,3101   0 0114 0         TC      SFTEMP2

1591    REF 135 LAST 273        04,3102   56 145 1 2ROUND  XCH     MPAC    +1
1592                            04,3103   6 0000 1         DOUBLE
```

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```
1593  REF 136 LAST 273   04,3104  54 145 0            TS    MPAC    +1
1594  REF 106 LAST 273   04,3105  0 0002 0            TC    Q       IF MPAC+1 DOES NOT OF/UF
1595  REF 137 LAST 274   04,3106  6 0144 0            AD    MPAC
1596  REF 138 LAST 274   04,3107  54 144 1            TS    MPAC
1597  REF 107 LAST 274   04,3110  0 0002 0            TC    Q       IF MPAC DOES NOT OF/UF
1598  REF   5 LAST 272   04,3111  54 111 1            TS    OVFIND
1599  REF 108 LAST 274   04,3112  0 0002 0  2RNDEND   TC    Q


1600  REF   6 LAST 274   04,3113  10 111 1  TESTOFJF  CCS   OVFIND  RETURNS IF NO OF/UF
1601  REF   9 LAST 272   04,3114  0 3315 0            TC    DSPALARM OF
1602  REF 109 LAST 274   04,3115  0 0002 0            TC    Q
1603  REF  10 LAST 274   04,3116  0 3315 0            TC    DSPALARM UF
```

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```
P1604   MONITOR ALLOWS OTHER KEYBOARD ACTIVITY. IT IS ENDED BY VERB TERMINATE,
R1605   ANY NVSUB CALL THAT PASSES THE DSPLOCK, OR ANOTHER MONITOR.

R1606   MONITOR ACTION IS SUSPENDED, BUT NOT ENDED, BY ANY KEYBOARD ACTION,
R1607   EXCEPT ERROR LIGHT RESET. IT BEGINS AGAIN WHEN KEY RELEASE IS PERFORMED.
R1608   MONITOR SAVES THE NOUN AND APPROPRIATE DISPLAY VERB IN MONSAVE. IT SAVES
R1609   NOUNCADR IN MONSAVE1. IF NOUN = MACHINE CADR TO BE SPECIFIED. BIT 15 OF
R1610   MONSAVE1 IS THE KILL MONITOR SIGNAL (KILLER BIT).

R1611   MONSAVE INDICATES IF MONITOR IS ON(+=ON, +0=OFF)
R1612   IF MONSAVE IS +, MONITOR ENTERS NO REQUEST, BUT TURNS KILLER BIT OFF.
R1613   IF MONSAVE IS +0, MONITOR ENTERS REQUEST AND TURNS KILLER BIT OFF.

R1614   NVSUB AND VB=TERMINATE TURN KILL MONITOR BIT ON.

R1615   IF KILLER BIT IS ON, MONREQ ENTERS NO FURTHER REQUESTS, ZEROS MONSAVE
R1616   AND MONSAVE1 (TURNING OFF KILLER BIT).



R1617   MONITOR DOSENT TEST FOR MATBS SINCE NVSUB CAN HANDLE INTERNAL MATBS NOW
 1618   REF   1                        05,3077          SETLOC ENDRUTIN

 1619   REF  22 LAST 267      05,3077  4 7745 1  MONITOR  CS     BIT15
 1620   REF   5 LAST 270      05,3100  7 0310 1           MASK   NOUNCADR
 1621   REF 139 LAST 274      05,3101  54 145 0  MONIT1   TS     MPAC    +1     TEMP STORAGE
 1622   REF   1               05,3102  3 3401 1           CAF    LOW6
 1623   REF  17 LAST 259      05,3103  7 0272 1           MASK   VERBREG
 1624   REF   4 LAST 269      05,3104  0 4541 0           TC     LEFT5
 1625   REF   5 LAST 242      05,3105  54 022 0           TS     CYL
 1626   REF   6 LAST 275      05,3106  56 022 1           XCH    CYL
 1627   REF   7 LAST 259      05,3107  6 0273 1           AD     NOUNREG
 1628   REF 140 LAST 275      05,3110  54 144 1           TS     MPAC           TEMP STORAGE
 1629   REF   2 LAST  98      05,3111  4 0330 0           CS     GRABLOCK       NEITHER CASE SEARCHES LIST.
 1630   REF  31 LAST 267      05,3112  6 7762 0           AD     TWO
 1631   REF 154 LAST 272      05,3113  10 000 0           CCS    A
 1632   REF   1               05,3114  0 4711 1           TC     RELDSP1        GRABLOCK=0,1, +0 INTO DSPLOCK AND
 1633                         05,3115  0 3121 0           TC     +4             TURN OFF KEY RLSE LIGHT.
 1634   REF   6 LAST 272      05,3116  0 4736 1           TC     CCSHOLE
 1635   REF  80 LAST 273      05,3117  3 7767 0           CAF    ZERO           GRABLOCK=2, +0 INTO DSPLOCK AND
 1636   REF   4 LAST 245      05,3120  54 303 0           TS     DSPLOCK        LEAVE KEY RLSE LIGHT ALONE
 1637                         05,3121  0 0004 0           INHINT
 1638   REF   2 LAST  98      05,3122  10 311 0           CCS    MONSAVE
 1639                         05,3123  0 3130 0           TC     +5             IF MONSAVE WAS +, NO REQUEST
 1640   REF  58 LAST 270      05,3124  3 7763 1           CAF    ONE            IF MONSAVE WAS 0, REQUEST MONREQ
 1641   REF  28 LAST 221      05,3125  0 5663 1           TC     WAITLIST
 1642   REF  29 LAST 270                    E0           EBANK= DSPCOUNT
 1643                         05,3126   03134 1           2CADR  MONREQ
C1643   REF   1               05,3127   12060 1
 1644   REF 141 LAST 275      05,3130  52 145 0           DXCH   MPAC           PLACE MONITOR VERB AND NOUN INTO MONSAVE
```

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```
1645  REF   3 LAST 275      05,3131  52 312 0          DXCH   MONSAVE       ZERO THE KILL MONITOR BIT
1646                        05,3132  0 0003 1          RELINT
1647  REF   4 LAST 250      05,3133  0 0126 1          TC     ENTRET

1648  REF   3 LAST 229      05,3134  0 4605 0  MONREQ   TC     LODSAMPT      CALLED BY WAITLIST
1649  REF   2 LAST  98      05,3135  10 312 0          CCS    MONSAVE1      TIME IS SNATCHED IN RUPT FOR NOUN 65
1650                        05,3136  0 3142 0          TC     +4            IF KILLER BIT = 0, ENTER REQUESTS
1651                        05,3137  0 3142 0          TC     +3            IF KILLER BIT = 0, ENTER REQUESTS
1652  REF   1               05,3140  0 3153 0          TC     KILLMON       IF KILLER BIT = 1, NO REQUESTS
1653  REF   2 LAST 276      05,3141  0 3153 0          TC     KILLMON       IF KILLER BIT = 1, NO REQUESTS
1654  REF   1               05,3142  3 3157 1          CAF    MONDEL
1655  REF  29 LAST 275      05,3143  0 5663 1          TC     WAITLIST      ENTER WAITLIST REQUEST FOR MONREQ
1656  REF  30 LAST 275                     E0          EBANK= DSPCOUNT
1657                        05,3144   03134 1          2CADR  MONREQ
C1657 REF   2 LAST 275      05,3145   12060 1
1658  REF   2 LAST 228      05,3146  3 5210 1          CAF    CHRPRIO
1659  REF  10 LAST 228      05,3147  0 5505 1          TC     NOVAC         ENTER EXEC REQUEST FOR MONDO
1660  REF  31 LAST 276                     E0          EBANK= DSPCOUNT
1661                        05,3150   03160 0          2CADR  MONDO
C1661 REF   1               05,3151   12060 1
1662  REF  20 LAST 222      05,3152  0 5727 0          TC     TASKOVER

1663  REF  31 LAST 275      05,3153  3 7767 0  KILLMON  CAF    ZERO          ZERO MONSAVE AND TURN KILLER BIT OFF
1664  REF   4 LAST 276      05,3154  54 311 0          TS     MONSAVE
1665  REF   3 LAST 276      05,3155  54 312 0          TS     MONSAVE1      TURN OFF KILL MONITOR BIT.
1666  REF  21 LAST 276      05,3156  0 5727 0          TC     TASKOVER

1667                        05,3157   00144 0  MONDEL   DCT    144           FOR 1 SEC MONITOR INTERVALS

1668  REF   4 LAST 276      05,3160  10 312 0  MONDO    CCS    MONSAVE1      CALLED BY EXEC
1669                        05,3161  0 3165 0          TC     +4            IF KILLER BIT = 0, CONTINUE
1670                        05,3162  0 3165 0          TC     +3            IF KILLER BIT = 0, CONTINUE
1671  REF  35 LAST 248      05,3163  0 5567 0          TC     ENDOFJOB      IN CASE TERMINATE CAME SINCE LAST MONREQ
1672  REF  36 LAST 276      05,3164  0 5567 0          TC     ENDOFJOB      IN CASE TERMINATE CAME SINCE LAST MONREQ
1673  REF   5 LAST 275      05,3165  10 303 0          CCS    DSPLOCK
1674  REF   1               05,3166  0 3212 0          TC     MONBUSY       NVSUB IS BUSY
1675  REF   2 LAST 275      05,3167  3 3401 1          CAF    LOW6          NVSUB IS AVAILABLE
1676  REF   5 LAST 276      05,3170  7 0311 0          MASK   MONSAVE
1677  REF   3 LAST 209      05,3171  54 113 0          TS     NVTEMP
1678  REF   2 LAST 209      05,3172  0 4460 1          TC     NVSUBMON      PLACE NOUN INTO NOUNREG AND DISPLAY IT
1679  REF  37 LAST 276      05,3173  0 5567 0          TC     ENDOFJOB      IN CASE OF ALARM DURING DISPLAY
1680  REF   1               05,3174  3 3210 1          CAF    MONMASK
1681  REF   6 LAST 276      05,3175  7 0311 0          MASK   MONSAVE       CHANGE MONITOR VERB TO DISPLAY VERB
1682  REF   3 LAST 269      05,3176  0 4532 1          TC     RIGHT5
```

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```
1683  REF   3 LAST  73     05,3177  54 020 1          TS     CYR
1684  REF   4 LAST 277     05,3200  56 020 0          XCH    CYR
1685  REF  18 LAST 275     05,3201  54 272 1          TS     VERBREG
1686  REF   1              05,3202  3 3211 0          CAF    MONBACK          SET RETURN TO PASTEVB AFTER DATA DISPLAY
1687  REF   5 LAST 276     05,3203  54 126 0          TS     ENTRET
1688  REF  23 LAST 275     05,3204  4 7745 1          CS     BIT15
1689  REF   5 LAST 276     05,3205  7 0312 0          MASK   MONSAVE1         PUT FCADR INTO MPAC +2. INTMCTBS WILL
1690  REF 142 LAST 275     05,3206  54 146 0          TS     MPAC     +2      DISPLAY IT AND SET NOUNCADR, NOJNADD,
1691  REF   1              05,3207  0 2037 1  ENDMONDO TC     TESTNN           EBANK.

1692  REF   1                       4435              SETLOC ENDRMODF

1693  REF   1                4435   3 4443 0  PASTEVB  CAF    MIDSIX
1694  REF   7 LAST 276       4436   7 0311 0           MASK   MONSAVE
1695  REF   4 LAST 276       4437   54 113 0           TS     NVTEMP           PLACE MONITOR VERB INTO VERBREG AND
1696  REF   3 LAST 276       4440   0 4460 1           TC     NVSUBMON              DISPLAY IT.
1697                         4441   0 4442 1           TC     +1               IN CASE OF ALARM DURING DISPLAY
1698  REF  38 LAST 276       4442   0 5567 0  ENDPASTE TC     ENDOFJOB

1699                         4443   07700 1   MIDSIX   OCTAL  07700


1700  REF   1                       05,3210           SETLOC ENDMONDO +1
1701                  05,3210  00700 0  MONMASK  OCT    700
1702  REF   1         05,3211  04435 1  MONBACK  ADRES  PASTEVB

1703  REF   1         05,3212  0 4601 1  MONBUSY  TC     RELDSPON         TURN KEY RELEASE LIGHT
1704  REF  39 LAST 277 05,3213  0 5567 0           TC     ENDOFJOB


R1705  DSPFMEM IS USED TO DISPLAY (IN OCTAL) ANY FIXED REGISTER.
R1706  IT IS USED WITH NOUN = MACHINE CADR TO BE SPECIFIED. THE FCADR OF THE
R1707  DESIRED LOCATION IS THEN PUNCHED IN. IT HANDLES F/F ( FCADR 4000-7777)

1708  REF   7 LAST 265     05,3214  3 4527 0  DSPFMEM  CAF    R1D1             IF F/F, DATACALL USES BANK 02 OR 03.
1709  REF  32 LAST 276     05,3215  54 270 0           TS     DSPCOUNT
1710  REF   6 LAST 275     05,3216  3 0310 0           CA     NOJNCADR         ORIGINAL FCADR LOADED STILL IN NOJNCADR.
1711  REF   1              05,3217  0 5241 0           TC     DATACALL
1712  REF   3 LAST 259     05,3220  0 3222 0           TC     DSPDCTWD
1713  REF  40 LAST 277     05,3221  0 5567 0           TC     ENDOFJOB
```

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```
P1714   DSPDECWD CONVERTS C(MPAC) AND C(MPAC +1)TO A SIGN AND 5 CHAR DECIMAL
R1715   STARTING IN LOC SPECIFIED IN DSPCOUNT

 1716   REF   4 LAST 273                04,3117                 SETLOC TESTOFUF +4

 1717   REF 110 LAST 274        04,3117  56 002 0  DSPDECWD  XCH   Q              USES SHORTMP THROUGHOUT
 1718   REF   1                 04,3120  54 105 1            TS    WDRET          CANT USE L FOR RETURN.+ON USES L.
 1719   REF 143 LAST 277        04,3121  10 144 1            CCS   MPAC
 1720                           04,3122  0 3131 1            TC    +7
 1721                           04,3123  0 3131 1            TC    +6
 1722   REF  59 LAST 275        04,3124  6 7763 1            AD    ONE
 1723   REF 144 LAST 278        04,3125  54 144 1            TS    MPAC
 1724   REF   2 LAST 244        04,3126  0 2321 0            TC    -ON
 1725   REF 145 LAST 278        04,3127  4 0145 0            CS    MPAC   +1
 1726                           04,3130  0 3133 0            TC    +3
 1727   REF   2 LAST 244        04,3131  0 2301 1            TC    +ON
 1728   REF 146 LAST 278        04,3132  56 145 1            XCH   MPAC   +1
 1729   REF   1                 04,3133  6 3172 0            AD    DECROUND
 1730   REF 147 LAST 278        04,3134  54 145 0            TS    MPAC   +1
 1731   REF  82 LAST 276        04,3135  3 7767 0            CAF   ZERO
 1732   REF 148 LAST 278        04,3136  6 0144 0            AD    MPAC
 1733   REF 149 LAST 278        04,3137  54 144 1            TS    MPAC
 1734                           04,3140  0 3144 0            TC    +4
 1735   REF  12 LAST 272        04,3141  3 7743 0            CAF   POSMAX
 1736   REF 150 LAST 278        04,3142  54 144 1            TS    MPAC
 1737   REF 151 LAST 278        04,3143  54 145 0            TS    MPAC   +1
 1738   REF   4 LAST 151        04,3144  3 7761 0            CAF   FOUR
 1739   REF   1                 04,3145  54 127 1  DSPDCWD1  TS    WDCNT
 1740   REF   2 LAST 246        04,3146  3 4570 1            CAF   BINCON
 1741   REF   4 LAST 263        04,3147  0 7357 1            TC    SHORTMP
 1742   REF 152 LAST 278        04,3150  50 144 0  TRACE1    INDEX MPAC
 1743   REF   3 LAST 241        04,3151  3 4300 0            CAF   RELTAB
 1744   REF   9 LAST 269        04,3152  7 4556 1            MASK  LOW5
 1745   REF   5 LAST 248        04,3153  54 114 1            TS    CODE
 1746   REF  83 LAST 278        04,3154  3 7767 0            CAF   ZERO
 1747   REF 153 LAST 278        04,3155  56 146 1            XCH   MPAC   +2
 1748   REF 154 LAST 278        04,3156  56 145 1            XCH   MPAC   +1
 1749   REF 155 LAST 278        04,3157  54 144 1            TS    MPAC
 1750   REF  33 LAST 277        04,3160  56 270 1            XCH   DSPCOUNT
 1751   REF   3 LAST 248        04,3161  54 133 1  TRACE1S   TS    COUNT
 1752   REF 165 LAST 275        04,3162  10 000 0            CCS   A              DECREMENT DSPCOUNT EXCEPT AT +0
 1753   REF  34 LAST 278        04,3163  54 270 0            TS    DSPCOUNT
 1754   REF   3 LAST 248        04,3164  0 3217 0            TC    DSPIN
 1755   REF   2 LAST 278        04,3165  10 127 1            CCS   WDCNT
 1756   REF   1                 04,3166  0 3145 1            TC    DSPDCWD1
 1757   REF   5 LAST 268        04,3167  4 4565 1            CS    VD1
 1758   REF  35 LAST 278        04,3170  54 270 0            TS    DSPCOUNT
 1759   REF   2 LAST 278        04,3171  0 0105 0            TC    WDRET

 1760                           04,3172  02476 0  DECROUND  OCT   02476
```

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```
R1761   DSP2DEC CONVERTS C(MPAC) AND C(MPAC+1) INTO A SIGN AND 10 CHAR DECIMAL
R1762   STARTING IN THE LOC SPECIFIED IN DSPCOUNT.

 1763   REF 111 LAST 278     04,3173  56 002 0  DSP2DEC  XCH   Q
 1764   REF   3 LAST 278     04,3174  54 105 1            TS    WDRET          MUST USE SAME RETURN AS DSPDECWD
 1765   REF  84 LAST 278     04,3175  3 7767 0            CAF   ZERO
 1766   REF   6 LAST 278     04,3176  54 114 1            TS    CODE
 1767   REF  12 LAST 250     04,3177  3 6311 1            CAF   THREE
 1768   REF   3 LAST 244     04,3200  0 3301 0            TC    11DSPIN        -R2 OFF
 1769   REF   5 LAST 278     04,3201  3 7761 0            CAF   FOUR
 1770   REF   4 LAST 279     04,3202  0 3301 0            TC    11DSPIN        +R2 OFF
 1771   REF 156 LAST 278     04,3203  10 144 1            CCS   MPAC
 1772                        04,3204  0 3214 0            TC    +8D
 1773                        04,3205  0 3214 0            TC    +7
 1774   REF  50 LAST 278     04,3206  6 7763 1            AD    ONE
 1775   REF 157 LAST 279     04,3207  54 144 1            TS    MPAC
 1776   REF   3 LAST 278     04,3210  0 2321 0            TC    -ON
 1777   REF 158 LAST 279     04,3211  4 0145 0            CS    MPAC  +1
 1778   REF 159 LAST 279     04,3212  54 145 0            TS    MPAC  +1
 1779                        04,3213  0 3215 1            TC    +2
 1780   REF   3 LAST 278     04,3214  0 2301 1            TC    +ON
 1781   REF   3 LAST 255     04,3215  3 4530 0            CAF   R2D1
 1782   REF   2 LAST 278     04,3216  0 3145 1  END2DEC   TC    DSPDCWD1


 1783   REF   2 LAST 252                05,3222          SETLOC DSPFMEM +6
R1784   DSPOCTWD DISPLAYS C(A) UPON ENTRY AS A 5 CHAR OCT STARTING IN THE DSP
R1785   CHAR SPECIFIED IN DSPCOUNT. IT STOPS AFTER 5 CHAR HAVE BEEN DISPLAYED.

 1786   REF   7 LAST 275     05,3222  54 022 0  DSPOCTWD TS    CYL
 1787   REF 112 LAST 279     05,3223  56 002 0            XCH   Q
 1788   REF   4 LAST 279     05,3224  54 105 1            TS    WDRET          MUST USE SAME RETURN AS DSP2BIT.
 1789   REF  26 LAST 186     05,3225  3 7746 0            CAF   BIT14          TO BLANK SIGNS
 1790   REF  36 LAST 278     05,3226  26 270 0            ADS   DSPCOUNT
 1791   REF   6 LAST 279     05,3227  3 7761 0            CAF   FOUR
 1792   REF   3 LAST 278     05,3230  54 127 1  WDAGAIN   TS    WDCNT
 1793   REF   8 LAST 279     05,3231  4 0022 0            CS    CYL
 1794   REF   9 LAST 279     05,3232  4 0022 0            CS    CYL
 1795   REF  10 LAST 279     05,3233  4 0022 0            CS    CYL
 1796   REF 156 LAST 278     05,3234  4 0000 0            CS    A
 1797   REF   1              05,3235  7 7765 0            MASK  DSPMSK
 1798   REF 157 LAST 279     05,3236  50 000 1            INDEX A
 1799   REF   4 LAST 278     05,3237  3 4300 0            CAF   RELTAB
 1800   REF  10 LAST 278     05,3240  7 4556 1            MASK  LOW5
 1801   REF   7 LAST 279     05,3241  54 114 1            TS    CODE
 1802   REF  37 LAST 279     05,3242  56 270 1            XCH   DSPCOUNT
 1803   REF   4 LAST 278     05,3243  54 133 1            TS    COUNT
 1804   REF 158 LAST 279     05,3244  10 000 0            CCS   A              DECREMENT DSPCOUNT EXCEPT AT +0
 1805   REF  38 LAST 279     05,3245  54 270 0            TS    DSPCOUNT
```

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```
1806  REF  20 LAST 272      05,3246  0 5225 1          TC     POSTJUMP
1807  REF   1              05,3247   11307 0          CADR   DSPOCTIN
1808  REF   4 LAST 279     05,3250  10 127 1  OCTBACK  CCS    WDCNT
1809  REF   1              05,3251  0 3230 0          TC     WDAGAIN      +
1810  REF   6 LAST 278     05,3252  4 4565 1  DSPLV    CS     VD1          TO BLOCK NUMERICAL CHARACTERS, CLEARS,
1811  REF  39 LAST 279     05,3253  54 270 0           TS     DSPCOUNT     AND SIGNS AFTER A COMPLETED DISPLAY.
1812  REF   5 LAST 279     05,3254  0 0105 0          TC     WDRET

1813  REF   6 LAST 151              7765  DSPMSK   =      SEVEN


R1814  DSP2BIT DISPLAYS C(A) UPON ENTRY AS A 2 CHAR OCT BEGINNING IN THE DSP
R1815  LOC SPECIFIED IN DSPCOUNT BY PRE CYCLING RIGHT C(A) AND USING THE LOGIC
R1816  OF THE 5 CHAR OCTAL DISPLAY

1817  REF   5 LAST 277     05,3255  54 020 1  DSP2BIT  TS     CYR
1818  REF 113 LAST 279     05,3256  56 002 0           XCH    Q
1819  REF   6 LAST 280     05,3257  54 105 1           TS     WDRET        CANT USE L AS RETURN, UPDATNN USES L.
1820  REF  61 LAST 279     05,3260  3 7763 1          CAF    ONE
1821  REF   5 LAST 280     05,3261  54 127 1          TS     WDCNT
1822  REF   6 LAST 280     05,3262  4 0020 1          CS     CYR
1823  REF   7 LAST 280     05,3263  4 0020 1          CS     CYR
1824  REF   8 LAST 280     05,3264  56 020 0          XCH    CYR
1825  REF  11 LAST 279     05,3265  54 022 0          TS     CYL
1826  REF   2 LAST 280     05,3266  0 3235 0          TC     WDAGAIN +5


R1827  FOR DSPIN PLACE 0/25 OCT INTO COUNT, 5 BIT RELAY CODE INTO CODE, BOTH
R1828  ARE DESTROYED. IF BIT14 OF COUNT IS 1, SIGN IS BLANKED WITH LEFT CHAR.
R1829  FOR DSPIN1 PLACE 0,1 INTO BIT11 OF CODE, 2 INTO COUNT, REL ADDRESS OF
R1830  DSPTAB ENTRY INTO DSREL.

1831  REF   1                      04,3217          SETLOC END2DEC +1

1832  REF 114 LAST 280     04,3217  56 002 0  DSPIN    XCH    Q            CANT USE L FOR RETURN, SINCE MANY OF THE
1833  REF   1              04,3220  54 104 0           TS     DSEXIT       ROUTINES CALLING DSPIN USE L AS RETURN.
1834  REF  11 LAST 279     04,3221  3 4556 0          CAF    LOW5
1835  REF   5 LAST 279     04,3222  7 0133 1          MASK   COUNT
1836  REF  15 LAST 268     04,3223  54 021 0          TS     SR
1837  REF  16 LAST 280     04,3224  56 021 1          XCH    SR
1838  REF   1              04,3225  54 131 0          TS     DSREL
1839  REF  21 LAST 217     04,3226  3 7763 1          CAF    BIT1
1840  REF   6 LAST 280     04,3227  7 0133 1          MASK   COUNT
1841  REF 159 LAST 279     04,3230  10 000 0          CCS    A
1842                       04,3231  0 3233 0          TC     +2           LEFT IF COUNT IS ODD
1843  REF   1              04,3232  0 3243 1          TC     DSPIN1  -1   RIGHT IF COUNT IS EVEN
1844  REF   8 LAST 279     04,3233  56 114 0          XCH    CODE
1845  REF   1              04,3234  0 4550 0          TC     SLEFT5       DOES NOT USE CYL
```

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```
 1846  REF   9 LAST 280     04,3235  54 114 1          TS     CODE
 1847  REF  27 LAST 279     04,3236  3 7746 0          CAF    BIT14
 1848  REF   7 LAST 280     04,3237  7 0133 1          MASK   COUNT
 1849  REF 170 LAST 280     04,3240  10 000 0          CCS    A
 1850  REF  32 LAST 275     04,3241  3 7762 0          CAF    TWO          BIT14 = 1, BLANK SIGN
 1851  REF  52 LAST 280     04,3242  6 7763 1          AD     ONE          BIT14 = 0, LEAVE SIGN ALONE
 1852  REF   8 LAST 281     04,3243  54 133 1          TS     COUNT        +0 INTO COUNT FOR RIGHT
A1853                                                                     +1 INTO COUNT FOR LEFT(SIGN LEFT ALONE)
A1854                                                                     +3 INTO COUNT FOR LEFT(TO BLANK SIGN)
 1855                        04,3244  0 0004 0  DSPIN1   INHINT
 1856  REF   2 LAST 280     04,3245  50 131 1          INDEX  DSREL
 1857  REF  30 LAST 249     04,3246  10 313 1          CCS    DSPTAB
 1858                        04,3247  0 3251 1          TC     +2           IF +
 1859  REF   7 LAST 275     04,3250  0 4736 1          TC     CCSHOLE
 1860  REF  53 LAST 281     04,3251  6 7763 1          AD     ONE          IF-
 1861  REF   1              04,3252  54 132 0          TS     DSMAG
 1862  REF   9 LAST 281     04,3253  50 133 0          INDEX  COUNT
 1863  REF   1              04,3254  7 3275 0          MASK   DSMSK
 1864                        04,3255  0 0006 1          EXTEND
 1865  REF  10 LAST 281     04,3256  60 114 0          SU     CODE
 1866                        04,3257  0 0006 1          EXTEND
 1867  REF   1              04,3260  1 3273 0          BZF    DSLV         SAME
 1868  REF  10 LAST 281     04,3261  50 133 0  DFRNT    INDEX  COUNT
 1869  REF   2 LAST 281     04,3262  4 3275 0          CS     DSMSK        MASK WITH 77740,76037, OR 75777
 1870  REF   2 LAST 281     04,3263  7 0132 0          MASK   DSMAG
 1871  REF  11 LAST 281     04,3264  6 0114 0          AD     CODE
 1872  REF 171 LAST 281     04,3265  4 0000 0          CS     A
 1873  REF   3 LAST 281     04,3266  50 131 1          INDEX  DSREL
 1874  REF  31 LAST 281     04,3267  56 313 0          XCH    DSPTAB
 1875                        04,3270  0 0006 1          EXTEND
 1876  REF   2 LAST 281     04,3271  6 3273 1          BZMF   DSLV         DSPTAB ENTRY WAS -
 1877  REF   6 LAST 249     04,3272  24 307 0          INCR   NOUT         DSPTAB ENTRY WAS +
 1878                        04,3273  0 0003 1  DSLV     RELINT
 1879  REF   2 LAST 280     04,3274  0 0104 1          TC     DSEXIT

 1880                        04,3275   00037 0  DSMSK    OCT    37
 1881                        04,3276   01740 0           OCT    1740
 1882                        04,3277   02000 0           OCT    2000
 1883                        04,3300   03740 1           OCT    3740

R1884  FOR 11DSPIN, PUT REL ADDRESSS OF DSPTAB ENTRY INTO A, 1 IN BIT11 OR 0 IN
R1885  BIT11 OF CODE.

 1886  REF   4 LAST 281     04,3301  54 131 0  11DSPIN  TS     DSREL
 1887  REF  33 LAST 281     04,3302  3 7762 0           CAF    TWO
 1888  REF  11 LAST 281     04,3303  54 133 1          TS     COUNT
 1889  REF 115 LAST 280     04,3304  56 002 0          XCH    Q            MUST USE SAME RETURN AS DSPIN
 1890  REF   3 LAST 281     04,3305  54 104 0          TS     DSEXIT
```

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```
 1891   REF   2 LAST 280      04,3306  0 3244 0           TC     DSPIN1


 1892   REF   4 LAST 278      04,3307  0 3217 0  DSPOCTIN TC     DSPIN          SO DSPOCTWD DOESNT USE SWCALL
 1893                         04,3310  3 3312 1           CAF    +2
 1894   REF   9 LAST 271      04,3311  0 5230 0           TC     BANKJUMP
 1895   REF   1               04,3312   13250 1  ENDSPOCT CADR   OCTBACK


R1896   DSPALARM FINDS TC NVSUBEND IN ENTRET FOR NVSUB INITIATED ROUTINES.
R1897   ABORT WITH 01501.
R1898   DSPALARM FINDS TC ENDOFJOB IN ENTRET FOR KEYBOARD INITIATED ROUTINES.
R1899   DO TC ENTRET.

 1900   REF   5 LAST 255      04,3313  3 4505 0  CHARALRM CAF    ENDINST        ALARMS WHICH MUST DO ENDOFJOBS COME
 1901   REF   6 LAST 277      04,3314  54 126 0           TS     ENTRET         HERE. ALLOWS ENTRET TO BE TEMP ERASABLE

 1902   REF   4 LAST 210      04,3315  0 4571 0  DSPALARM TC     FALTON         TURN ON OPERATOR ERROR LIGHT
 1903   REF   1               04,3316  4 3325 1           CS     NVSBENDL
 1904   REF   7 LAST 265      04,3317  6 0126 1           AD     ENTEXIT
 1905                         04,3320  0 0006 1           EXTEND
 1906                         04,3321  1 3323 1           BZF    +2             NVSUB INITIATED. ABORT
 1907   REF   8 LAST 282      04,3322  0 0126 1           TC     ENTEXIT        NOT NVSUB INITIATED.
 1908   REF   3 LAST 159      04,3323  0 6000 1           TC     ABORT
 1909                         04,3324   01501 1           OCT    01501
 1910   REF   1               04,3325  0 4464 0  NVSBENDL TC     NVSJBEND


R1911   MMCHANG USES NOUN DISPLAY UNTIL ENTER. THEN IT USES MODE DISP.
R1912   IT GOES TO MODROUT WITH THE NEW M M CODE IN A, BUT NOT DISPLAYED IN
R1913   M M LIGHTS.

 1914   REF   2 LAST 256               05,3267           SETLOC DSP2BIT  +10D

 1915   REF   1               05,3267  0 3302 0  MMCHANG TC     REQMM
 1916   REF  85 LAST 279      05,3270  3 7767 0           CAF    ZERO
 1917   REF   8 LAST 275      05,3271  56 273 1           XCH    NOUNREG
 1918   REF 150 LAST 279      05,3272  54 144 1           TS     MPAC
 1919   REF   3 LAST 255      05,3273  3 4566 0           CAF    ND1
 1920   REF  40 LAST 280      05,3274  54 270 0           TS     DSPCOUNT
 1921   REF  21 LAST 261      05,3275  0 5206 0           TC     BANKCALL
 1922   REF   4 LAST 248      05,3276   10557 1           CADR   2BLANK
 1923   REF 151 LAST 282      05,3277  3 0144 0           CA     MPAC
 1924   REF  21 LAST 280      05,3300  0 5225 1           TC     POSTJUMP
 1925   REF   1               05,3301   11315 0           CADR   MODROUTB        GO THRU STANDARD LOC.
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 1926   REF  11 LAST 274                  04,3315  MODROUTB =      DSPALARM        **FIX LATER**
 1927   REF 116 LAST 281          05,3302  4 0002 1 REQMM   CS      Q
 1928   REF   9 LAST 255          05,3303  54 304 1         TS      REQRET
 1929   REF   4 LAST 282          05,3304  3 4566 0         CAF     NDI
 1930   REF  41 LAST 282          05,3305  54 270 0         TS      DSPCOUNT
 1931   REF  86 LAST 282          05,3306  3 7767 0         CAF     ZERO
 1932   REF   9 LAST 282          05,3307  54 273 0         TS      NOUNREG
 1933   REF  22 LAST 282          05,3310  0 5206 0         TC      BANKCALL
 1934   REF   5 LAST 282          05,3311   10557 1         CADR    2BLANK
 1935   REF   5 LAST 255          05,3312  0 4622 0         TC      FLASHON
 1936   REF   9 LAST 282          05,3313  0 0126 1         TC      ENTEXIT


R1937   VBRQEXEC ENTERS REQUEST TO EXEC     FOR ANY ADDRESS WITH ANY PRIORITY.
R1938   IT DOES ENDOFJOB AFTER ENTERING REQUEST. DISPLAY SYST IS RELEASED.
R1939   IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R1940   COMPONENT 1  PRIORITY(BITS 10-14) BIT1=0 FOR NOVAC, BIT1=1 FOR FINDVAC.
R1941   COMPONENT 2  JOB ADRES (12 BIT )
R1942   COMPONENT 3  BBCON

 1943   REF  22 LAST 280          05,3314  3 7763 1 VBRQEXEC CAF     BIT1
 1944   REF   4 LAST 219          05,3315  7 0337 1         MASK    DSPTEM1
 1945   REF 172 LAST 281          05,3316  10 000 0         CCS     A
 1946   REF   1                   05,3317  0 3336 1         TC      SETVAC          IF BIT1 = 1, FINDVAC
 1947   REF   1                   05,3320  3 5723 1         CAF     TCNOVAC         IF BIT1 = 0, NOVAC
 1948   REF 152 LAST 282          05,3321  54 144 1 REQEX1  TS      MPAC            TC NOVAC  OR  TC FINDVAC INTO MPAC
 1949   REF  23 LAST 283          05,3322  4 7763 0         CS      BIT1
 1950   REF   5 LAST 283          05,3323  7 0337 1         MASK    DSPTEM1
 1951   REF 163 LAST 283          05,3324  54 150 1         TS      MPAC    +4      PRIO INTO MPAC+4 AS A TEMP
 1952   REF   4 LAST 252          05,3325  0 4666 0 REQUESTC TC      RELDSP
 1953   REF   6 LAST 282          05,3326  3 4505 0         CA      ENDINST
 1954   REF 164 LAST 283          05,3327  54 147 1         TS      MPAC    +3      TC ENDOFJOB INTO MPAC+3
 1955                             05,3330  0 0006 1         EXTEND
 1956   REF   6 LAST 283          05,3331  3 0341 1         DCA     DSPTEM1 +1      JOB ADRES INTO MPAC+1
 1957   REF 165 LAST 283          05,3332  52 146 0         DXCH    MPAC    +1      BBCON INTO MPAC+2
 1958   REF 166 LAST 283          05,3333  3 0150 0         CA      MPAC    +4      PRIO IN A
 1959                             05,3334  0 0004 0         INHINT
 1960   REF 167 LAST 283          05,3335  0 0144 0         TC      MPAC

 1961   REF   1                   05,3336  3 4562 1 SETVAC   CAF     TCFINDVC
 1962   REF   1                   05,3337  0 3321 1         TC      REQEX1

R1963   VBRQWAIT ENTERS REQUEST TO WAITLIST FOR ANY ADDRESS WITH ANY DELAY.
R1964   IT DOES ENDOFJOB AFTER ENTERING REQUEST.DISPLAY SYST IS RELEASED.
R1965   IT ASSUMES NOUN 26 HAS BEEN PRELOADED WITH
R1966   COMPONENT 1  DELAY (LOW BITS)
R1967   COMPONENT 2  TASK ADRES (12 BIT)
R1968   COMPONENT 3  BBCON
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```
1969  REF   1              05,3340  3 4561 1  VBRQWAIT CAF    TCWAIT
1970  REF 158 LAST 283     05,3341  54 144 1            TS     MPAC          TC WAITLIST INTO MPAC
1971  REF   7 LAST 283     05,3342  3 0337 0            CA     DSPTEM1       TIME DELAY
1972  REF   1              05,3343  0 3324 1  ENDRQWT   TC     REQUESTC -1

R1973 REQUESTC WILL PUT TASK ADRES INTO MPAC+1, BBCON INTO MPAC+2,
R1974 TC ENDOFJOB INTO MPAC+3. IT WILL TAKE TIME DELAY OUT OF MPAC+4 AND
R1975 LEAVE IT IN A, INHINT AND TC MPAC.


1976  REF   2 LAST 282              04,3326           SETLOC NVSBFNDL +1
1977  REF  54 LAST 281     04,3326  3 7763 1  VBPROC   CAF    ONE           PROCEED WITHOUT DATA
1978  REF   2 LAST 268     04,3327  54 305 0            TS     LOADSTAT
1979  REF   5 LAST 283     04,3330  0 4666 0            TC     RELDSP
1980  REF   3 LAST 250     04,3331  0 4626 1            TC     FLASHOFF
1981  REF   2 LAST 268     04,3332  0 3440 1            TC     RECALTST      SEE IF THERE IS ANY RECALL FROM ENDIDLE


1982  REF   1              04,3333  0 4466 1  VBTERM    TC     KILMONON      TURN ON KILL MONITOR BIT
1983  REF  55 LAST 284     04,3334  4 7763 0            CS     ONE
1984  REF   2 LAST 253     04,3335  0 3327 1            TC     VBPROC  +1    TERM VERB SETS LOADSTAT NEG

R1985 FLASH IS TURNED OFF ONLY BY PROCEED WITHOUT DATA, TERMINATE, END OF LOAD


R1986 VBRELDSP TURNS OFF RELEASE DISPLAY SYSTEM LIGHT(AND SEARCHES LIST ONLY
R1987 IF THIS LIGHT WAS TURNED ON BY NVSUBUSY), AND TURNS OFF UPACT LIGHT.

1988  REF  15 LAST 229     04,3336  4 7761 1  VBRELDSP CS     BIT3
1989                       04,3337  0 0006 1            EXTEND
1990  REF   4 LAST 246     04,3340  03 011 1            WAND   DSALMOUT      TURN OFF UPACT LIGHT
1991  REF   6 LAST 284     04,3341  0 4666 0            TC     RELDSP        SEARCHES LIST
1992  REF  41 LAST 277     04,3342  0 5567 0            TC     ENDOFJOB


R1993 BUMP SHIFTS WORD DISPLAYED IN R2 TO R3, R1 TO R2. IT BLANKS R1.

1994  REF   4 LAST 266     04,3343  3 7766 1  BUMP      CAF    FIVE          R2D5
1995  REF  42 LAST 283     04,3344  54 270 0            TS     DSPCOUNT
1996  REF  12 LAST 281     04,3345  54 133 1            TS     COUNT
1997  REF  56 LAST 284     04,3346  3 7763 1            CAF    ONE           SHIFT DATA OF R2 TO R3, R1 TO R2
1998  REF  13 LAST 284     04,3347  7 0133 1            MASK   COUNT
1999  REF  14 LAST 284     04,3350  56 133 0            XCH    COUNT         +0 INTO COUNT IF EVEN (RIGHT)
2000  REF  17 LAST 280     04,3351  54 021 0            TS     SR            +1 INTO COUNT IF ODD (LEFT)
```

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```
2001  REF  18 LAST 284   04,3352  56 021 1          XCH   SR        DSREL IN A
2002  REF 173 LAST 283   04,3353  50 000 1          INDEX A
2003  REF  32 LAST 281   04,3354  10 313 1          CCS   DSPTAB
2004                     04,3355  0 3357 0          TC    +2
2005  REF   8 LAST 281   04,3356  0 4736 1          TC    CCSHOLE
2006  REF  57 LAST 284   04,3357  6 7763 1          AD    ONE       DSMAG IN A
2007  REF  15 LAST 284   04,3360  50 133 0          INDEX COUNT
2008  REF   3 LAST 281   04,3361  7 3275 0          MASK  DSMSK
2009  REF  16 LAST 285   04,3362  50 133 0          INDEX COUNT
2010                     04,3363  0 3364 0          TC    +1
2011                     04,3364  0 3366 1          TC    +2        EVEN(RIGHT)  OK
2012  REF   4 LAST 276   04,3365  0 4532 1          TC    RIGHT5    ODD(LEFT)  SHIFT RIGHT
2013  REF  12 LAST 281   04,3366  54 114 1          TS    CODE
2014  REF   5 LAST 284   04,3367  4 7766 0          CS    FIVE
2015  REF  43 LAST 284   04,3370  6 0270 1          AD    DSPCOUNT  DSPCOUNT=5
2016  REF 174 LAST 285   04,3371  10 000 0          CCS   A         TO PREVENT -0
2017  REF  58 LAST 285   04,3372  6 7763 1          AD    ONE
2018                     04,3373  0 3375 0          TC    +2
2019  REF   9 LAST 285   04,3374  0 4736 1          TC    CCSHOLE
2020  REF  17 LAST 285   04,3375  54 133 1          TS    COUNT
2021  REF   5 LAST 282   04,3376  0 3217 0          TC    DSPIN     CODE ALREADY IN CODE
2022  REF  44 LAST 285   04,3377  4 0270 0          CS    DSPCOUNT
2023  REF   8 LAST 277   04,3400  6 4527 0          AD    R1D1      OCT 16
2024  REF 175 LAST 285   04,3401  10 000 0          CCS   A
2025  REF  45 LAST 285   04,3402  56 270 1          XCH   DSPCOUNT  +, DSPCOUNT L/ OCT 16
2026  REF  59 LAST 285   04,3403  6 7763 1          AD    ONE       INCREMENT DSPCOUNT
2027  REF   2 LAST 252   04,3404  0 3344 1          TC    BUMP  +1

2028  REF  87 LAST 283   04,3405  3 7767 0  SWSGN    CAF   ZERO      -0, DSPCOUNT= OCT 16, DO SIGN SHIFT
2029  REF  46 LAST 285   04,3406  54 270 0          TS    DSPCOUNT
2030  REF   1            04,3407  6 3436 0          AD    SWTAB  +2  OCT 3
2031  REF 176 LAST 285   04,3410  50 000 1          INDEX A           PICKUP ORDER , DSREL=3,4,5,6,
2032  REF  33 LAST 285   04,3411  10 313 1          CCS   DSPTAB                     (-R2,+R2,-R1,+R1)
2033                     04,3412  0 3414 0          TC    +2
2034  REF  10 LAST 285   04,3413  0 4736 1          TC    CCSHOLE
2035  REF  70 LAST 285   04,3414  6 7763 1          AD    ONE
2036  REF  20 LAST 271   04,3415  7 7751 1          MASK  BIT11
2037  REF  13 LAST 285   04,3416  54 114 1          TS    CODE
2038  REF  47 LAST 285   04,3417  50 270 1          INDEX DSPCOUNT
2039  REF   2 LAST 285   04,3420  3 3434 1          CAF   SWTAB       PUT AWAY ORDER, DSREL= 0,1,3,4,
2040  REF   5 LAST 279   04,3421  0 3301 0          TC    11DSPIN                   (-R3,+R3,-R2,+R2.)
2041  REF  48 LAST 285   04,3422  4 0270 0          CS    DSPCOUNT
2042  REF   3 LAST 285   04,3423  6 3436 0          AD    SWTAB  +2  OCT 3
2043  REF 177 LAST 285   04,3424  10 000 0          CCS   A
2044  REF  49 LAST 285   04,3425  56 270 1          XCH   DSPCOUNT  +, DSPCOUNT L/ 3
2045  REF  71 LAST 285   04,3426  6 7763 1          AD    ONE       INCREMENT DSPCOUNT
2046  REF   1            04,3427  0 3406 0          TC    SWSGN  +1
2047  REF   9 LAST 285   04,3430  3 4527 0          CAF   R1D1      -0,       DSPCOUNT = 3
2048  REF  50 LAST 285   04,3431  54 270 0          TS    DSPCOUNT
2049  REF   3 LAST 255   04,3432  0 2514 0          TC    5BLANK    BLANKS R1
```

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```
2050  REF  10 LAST 283     04,3433  0 0126 1            IC      ENTEXIT

2051                       04,3434  00000 1  SWTAB      OCT     0              -R3
2052                       04,3435  00001 0             OCT     1              +R3
2053                       04,3436  00003 1             OCT     3              -R2
2054                       04,3437  00004 0             OCT     4              +R2
```

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```
R2055   NVSUB IS USED FOR SUB ROUTINE CALLS FROM WITHIN COMPUTER. IT CAN BE
R2056   USED TO DO ANY THING THE KEYBOARD CAN CALL. PLACE  ...VVVVVVNNNNNN
R2057   INTO A.       V-S ARE 6 BIT VERB CODE. N-S , 6 BIT NOUN CODE.

R2058   NVSUB CAN BE USED WITH MACH CADR TO BE SPEC BY PLACING THE CADR INTO
R2059   MPAC+2 BEFORE THE STANDARD NVSUB CALL.

R2060    NVSUB RETURNS TO 2+ CALLING LOC AFTER PERFORMING TASK, IF DISPLAY
R2061   SYSTEM IS AVAILABLE. THE NEW NOUN AND VERB CODES ARE DISPLAYED.
R2062   IF V-S =0, THE NEW NOUN CODE IS DISPLAYED ONLY(RETURN WITH NO FURTHER
R2063   ACTION). IF N-S =0, THE NEW VERB CODE IS DISPLAYED ONLY(RETURN WITH NO
R2064   FURTHER ACTION).

R2065   IT RETURNS TO 1+ CALLING LOC WITHOUT PERFORMING TASK, IF DISPLAY
R2066   SYSTEM IS BLOCKED (NOTHING IS DISPLAYED IN THIS CASE).
R2067   IT DOES TO ABORT (WITH OCT 01501) IF IT ENCOUNTERS A DISPLAY PROGRAM
R2068   ALARM CONDITION BEFORE RETURN TO CALLER.

R2069   THE DISPLAY SYSTEM IS BLOCKED BY THE DEPRESSION OF ANY
R2070   KEY, EXCEPT ERROR LIGHT RESET. ALSO BY ENDIDLE.
R2071        IT IS RELEASED BY SPECIAL VERB = RELEASE DISPLAY, ALL GO TO VERBS,
R2072   PROCEED WITHOUT DATA, TERMINATE, INITIALIZE EXECUTIVE.
R2073   RECALL PART OF RECALTST IF ENDIDLE WAS USED.
R2074   IN RECALTST IF NVSUB INITIATED LOAD AND ENDIDLE WAS NOT USED.
R2075   VB = REQUEST EXECUTIVE, VB = REQUEST WAITLIST.
R2076   MONITOR SET UP.

R2077   A NVSUB CALL THAT PASSES DSPLOCK ENDS OLD MONITOR.

R2078   DSPLOCK IS THE INTERLOCK FOR USE OF KEYBOARD AND DISPLAY SYSTEM WHICH
R2079   LOCKS OUT INTERNAL USE WHENEVER THERE IS EXTERNAL KEYBOARD ACTION.

R2080   NVSUB IN FIXED-FIXED PLACES 2+CALLING LOC INTO NVQTEM, TO NVSUBEND INTO
R2081   ENTRET. (THIS WILL RESTORE OLD CALLING BANK BITS)

 2082   REF   2 LAST 277                    4444                SETLOC  MIDSIX  +1
 2083   REF   5 LAST 277          4444   54 113 0  NVSUB       TS      NVTEMP          IN FIXED FIXED
 2084   REF   6 LAST 276          4445   10 303 0              CCS     DSPLOCK
 2085   REF 117 LAST 283          4446   0 0002 0              TC      Q               DSP SYST BLOCKED, RET TO 1+ CALLING LOC
 2086   REF 118 LAST 287          4447   3 0002 0              CA      Q               DSP SYST AVAILABLE
 2087   REF  72 LAST 285          4450   6 7763 1              AD      ONE
 2088   REF   1                   4451   54 331 1              TS      NVQTEM          2 + CALLING LOC INTO NVQTEM
 2089   REF   2 LAST 284          4452   0 4466 I              TC      KILMONON        TURN ON KILL MONITOR BIT
 2090   REF   1                   4453   3 4457 0  NVSUBCOM  CAF     NVSBBNK

 2091   REF  12 LAST  83          4454   56 006 1              XCH     BBANK
 2092   REF   1                   4455   54 332 1              TS      NVBNKTEM
 2093   REF   1                   4456   0 2000 0              TC      NVSJBB          GO TO NVSUB1 THRU STANDARD LOC
 2094   REF  51 LAST 285                      E0              EBANK=  DSPCOUNT
 2095   REF   2 LAST 250          4457    12060 1  NVSBBBNK  BBCON   NVSJB1
```

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```
2096   REF 119 LAST 287      4460  3 0002 0  NVSUBMON CA    Q          MONDO COMES HERE
2097   REF  73 LAST 287      4461  6 7763 1           AD    ONE
2098   REF   2 LAST 287      4462  54 331 1           TS    NVQTEM     2 + CALLING LOC INTO NVQTEM
2099   REF   1               4463  0 4453 1           TC    NVSUBCOM


2100   REF   3 LAST 288      4464  52 332 1  NVSUBEND XCH   NVQTEM     NVBNKTEM MUST = NVQTEM+1
2101   REF  12 LAST 271      4465  52 006 0           XCH   Z          DTCB

2102   REF   1                     05,3344            SETLOC ENDRQWT +1

2103   REF   1              05,3344  3 3363 1  NVSUB1   CAF   ENTSET     IN BANK
2104   REF   7 LAST 282     05,3345  54 126 0           TS    ENTRET     SET RETURN TO NVSUBEND
2105   REF   3 LAST 276     05,3346  3 3401 1           CAF   LOW6
2106   REF   6 LAST 287     05,3347  7 0113 0           MASK  NVTEMP
2107   REF 159 LAST 284     05,3350  54 144 1           TS    MPAC       TEMP STORAGE
2108   REF   1              05,3351  3 3402 1           CAF   MID6
2109   REF   7 LAST 288     05,3352  7 0113 0           MASK  NVTEMP
2110   REF   5 LAST 285     05,3353  0 4532 1           TC    RIGHT5
2111   REF   9 LAST 280     05,3354  54 020 1           TS    CYR
2112   REF  10 LAST 288     05,3355  56 020 0           XCH   CYR
2113   REF 170 LAST 288     05,3356  54 145 0           TS    MPAC   +1   TEMP STORAGE
2114   REF 171 LAST 288     05,3357  10 144 1           CCS   MPAC       TEST NOUN
2115                        05,3360  0 3364 0           TC    +4         IF NOUN NOT +0, GO ON
2116   REF 172 LAST 288     05,3361  56 145 1           XCH   MPAC   +1
2117   REF   7 LAST 266     05,3362  0 2314 0           TC    UPDATVB -1   IF NOUN = +0, DISPLAY VERB , THEN RETURN
2118   REF   2 LAST 282     05,3363  0 4464 0  ENTSET   TC    NVSUBEND
2119   REF 173 LAST 288     05,3364  10 145 0           CCS   MPAC   +1   TEST VERB
2120                        05,3365  0 3371 1           TC    +4         IF VERB NOT +0, GO ON
2121   REF 174 LAST 288     05,3366  56 144 0           XCH   MPAC
2122   REF   1              05,3367  0 2274 1           TC    UPDATNN -1   IF VERB = +0, DISPLAY NOUN, THEN RETURN
2123   REF   3 LAST 288     05,3370  0 4464 0           TC    NVSUBEND
2124   REF 175 LAST 288     05,3371  56 145 1           XCH   MPAC   +1
2125   REF   8 LAST 288     05,3372  0 2314 0           TC    UPDATVB -1   IF BOTH NOUN AND VERB NOT +0, DISPLAY
2126   REF 176 LAST 288     05,3373  56 144 0           XCH   MPAC       BOTH AND GO TO ENTPASO
2127   REF   2 LAST 288     05,3374  0 2274 1           TC    UPDATNN -1
2128   REF  88 LAST 285     05,3375  3 7767 0           CAF   ZERO
2129   REF   3 LAST 284     05,3376  54 305 0           TS    LOADSTAT   SET FOR WAITING FOR DATA CONDITION
2130   REF  12 LAST 267     05,3377  54 306 0           TS    CLPASS
2131   REF   3 LAST 250     05,3400  0 2031 1           TC    ENTPASO

R2132  IF INTERNAL MACH CADR TO BE SPECIFIED, MPAC+2 WILL BE PLACED INTO
R2133  NOUNCADR IN ENTPASO (INTMCTBS ).


2134                        05,3401  00077 1  LOW6     OCT   77
2135                        05,3402  07700 1  MID6     OCT   7700
```

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```
 2136   REF   4 LAST 288                    4466                    SETLOC  NVSUBEND +2
 2137   REF  24 LAST 277          4466  4 7745 1  KILMONON CS      BIT15   FORCE BIT 15 OF MONSAVE1 TO 1.
 2138                             4467  0 0004 0           INHINT           THIS IS THE KILL MONITOR BIT.
 2139   REF   6 LAST 277          4470  7 0312 0           MASK    MONSAVE1
 2140   REF  25 LAST 289          4471  6 7745 0           AD      BIT15
 2141   REF   7 LAST 289          4472  54 312 0           TS      MONSAVE1
 2142                             4473  0 0003 1           RELINT
 2143   REF 120 LAST 288          4474  0 0002 0           TC      Q


R2144   LOADSTAT  +0 INACTIVE(WAITING FOR DATA). SET BY NVSUB
R2145             +1  PROCEED NO DATA. SET BY SPECIAL VERB
R2146           -1 TERMINATE   SET BY SPECIAL VERB
R2147           -0 DATA IN   SET BY END OF LOAD ROUTINE


R2148   L  TC ENDIDLE  (FIXED) FIXED)
R2149   ROUTINES THAT REQUEST LOADS THROUGH NVSUB SHOULD USE ENDIDLE WHILE
R2150   WAITING FOR THE DATA TO BE LOADED. ENDIDLE PUTS CURRENT JOB TO SLEEP.
R2151   ENDIDLE CANNOT BE CALLED FROM ERASABLE MEMORY, SINCE JOBSLEEP AND
R2152   JOBWAKE CAN HANDLE ONLY FIXED MEMORY.
R2153   RECALTST TESTS LOADSTAT AND WAKES JOB UP TO.
R2154   L+1       FOR TERMINATE
R2155   L+2       FOR PROCEED WITHOUT DATA
R2156   L+3       FOR DATA IN
R2157   IT DOES NOTHING     IF LOADSTAT INDICATES WAITING FOR DATA.

 2158   REF  74 LAST 288          4475  3 7763 1  ENDIDLE  CAF     ONE
 2159   REF   7 LAST 287          4476  54 303 0           TS      DSPLOCK
 2160   REF   1                   4477  22 004 0           LXCH    FBANK
 2161   REF 121 LAST 289          4500  56 002 0           XCH     Q
 2162   REF   5 LAST 199          4501  52 124 1           DXCH    BUF2
 2163   REF   4 LAST 220          4502  0 5235 0           TC      MAKEADR
 2164   REF   5 LAST 255          4503  54 327 0           TS      CADRSTOR
 2165   REF   3 LAST 157          4504  0 5545 0           TC      JOBSLEEP


 2166   REF  42 LAST 284          4505  0 5567 0  ENDINST  TC      ENDOFJOB

R2167   DATAWAIT IS AN ALTERNATIVE TO ENDIDLE. IT RETURNS IMMEDIATELY IF
R2168   LOADSTAT INDICATES THAT DATA IS ALREADY IN, OR PROCEED OR TERMINATE HAS
R2169   BEEN EXECUTED. RETURN FORMAT IS SAME AS FOR ENDIDLE.
R2170   DATAWAIT CANNOT BE CALLED FROM ERASABLE MEMORY, SINCE JOBSLEEP
R2171   AND JOBWAKE CAN HANDLE ONLY FIXED MEMORY.
R2172   DATAWAIT SHOULD BE USED ONLY AFTER REQUESTING A LOAD VERB.

 2173   REF   4 LAST 288          4506  10 305 0  DATAWAIT CCS     LOADSTAT
```

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```
 2174   REF   1                4507  1 7015 0            TCF    DATWAIT1       PROCEED. RETURN TO L+2.
 2175   REF  17 LAST 221       4510  1 4475 1            TCF    ENDIDLE        STILL WAITING. GO TO SLEEP.
 2176   REF 122 LAST 289       4511  0 0002 0            TC     Q              TERMINATE. RETURN TO L+1.
 2177   REF   4 LAST 168       4512  1 7017 1            TCF    Q+2            DATA IN. RETURN TO L+3
 2178   REF   3 LAST 168                7015  DATWAIT1 =    Q+1            RETURN TO L+2

R2179   DATAWAIT DOES NOT RELEASE DISPLAY SYST. IT IS RELEASED AT END OF NVSUB
R2180   INITIATED LOAD, IF ENDIDLE WAS NOT USED.


 2181   REF   2 LAST 288                05,3403             SETLOC MID6  +1
R2182   DSPMM  PLACE MAJOR MODE CODE INTO MODREG

 2183   REF   1                05,3403  3 4567 1  DSPMM1    CAF    MD1            GETS HERE THRU DSPMM (STANDARD LEAD IN)
 2184   REF  52 LAST 287       05,3404  56 270 1             XCH    DSPCOUNT
 2185   REF   1                05,3405  54 130 1             TS     DSPMMTEM       SAVE DSPCOUNT
 2186   REF   8 LAST 210       05,3406  3 0302 0             CA     MODREG
 2187   REF 123 LAST 290       05,3407  22 002 0             XCH    Q
 2188   REF   3 LAST 282       05,3410  0 3255 0             TC     DSP2BIT
 2189   REF   2 LAST 290       05,3411  56 130 0             XCH    DSPMMTEM       RESTORE DSPCOUNT
 2190   REF  53 LAST 290       05,3412  54 270 0             TS     DSPCOUNT
 2191   REF  60 LAST 269       05,3413  0 0001 0  DSPMMEND  TC     L


R2192   RECALTST IS ENTERED DIRECTLY AFTER DATA IS
R2193   LOADED, TERMINATE VERB IS EXECUTED, OR THE PROCEED WITHOUT DATA VERB IS
R2194   EXECUTED. IT WAKES UP JOB THAT DID TC ENDIDLE.

R2195   IF NVSUB INITIATED LOAD, AND ENDIDLE WAS NOT USED, THEN IT RELEASES
R2196   DISPLAY SYST. (NEEDED FOR DATAWAIT)

 2197   REF   4 LAST 285                04,3440             SETLOC SWTAB  +4

 2198   REF   6 LAST 289       04,3440  10 327 0  RECALTST  CCS    CADRSTOR
 2199   REF   1                04,3441  0 3446 1             TC     RECAL1
 2200   REF  43 LAST 289       04,3442  0 5567 0             TC     ENDOFJOB       NORMAL EXIT IF KEYBOARD INITIATED
 2201   REF   2 LAST 290       04,3443  0 3446 1             TC     RECAL1
 2202   REF   7 LAST 290       04,3444  54 327 0             TS     CADRSTOR       -0, CONCLUSION OF NVSUB INITIATED LOAD.
 2203   REF   1                04,3445  0 3464 1             TC     RECAL3         +0 INTO CADRSTOR, RELEASE DISPLAY,
A2204                                                                               AND ENDOFJOB. NEEDED FOR DATAWAIT.
 2205   REF  89 LAST 288       04,3446  3 7767 0  RECAL1     CAF    ZERO
 2206   REF   8 LAST 290       04,3447  56 327 1             XCH    CADRSTOR
 2207                          04,3450  0 0004 0             INHINT
 2208   REF   3 LAST 156       04,3451  0 5551 0             TC     JOBWAKE
 2209   REF   5 LAST 289       04,3452  10 305 0             CCS    LOADSTAT
 2210   REF   1                04,3453  0 3470 1             TC     DOPROC         + PROCEED WITHOUT DATA
 2211   REF  44 LAST 290       04,3454  0 5567 0             TC     ENDOFJOB       PATHALOGICAL CASE EXIT
 2212   REF   1                04,3455  0 3466 0             TC     DOTERM         -   TERMINATE
```

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```
2213  REF  34 LAST 281   04,3456  3 7762 0          CAF     TWO
2214  REF   6 LAST 228   04,3457  50 064 0  RECAL2  INDEX   LOCCTR
2215  REF   4 LAST 166   04,3460  6 0154 1          AD      LOC          LOC IS + FOR BASIC JOBS
2216  REF   7 LAST 291   04,3461  50 064 0          INDEX   LOCCTR
2217  REF   5 LAST 291   04,3462  54 154 0          TS      LOC
2218                     04,3463  0 0003 1          RELINT
2219  REF   2 LAST 275   04,3464  0 4711 1  RECAL3  TC      RELDSP1      DOES NOT SEARCH LIST
2220  REF  45 LAST 290   04,3465  0 5567 0          TC      ENDOFJOB

2221  REF  90 LAST 290   04,3466  3 7767 0  DOTERM  CAF     ZERO
2222  REF   1            04,3467  0 3457 1          TC      RECAL2

2223  REF  75 LAST 289   04,3470  3 7763 1  DOPROC  CAF     ONE
2224  REF   2 LAST 291   04,3471  0 3457 1          TC      RECAL2
```

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P2225 THE FOLLOWING REFERS TO THE NOUN TABLES

R2226	COMPONENT CODE NUMBER	INTERPRETATION
R2227	00000	1 COMPONENT
R2228	00001	2 COMPONENT (EACH S P)
R2229	00010	3 COMPONENT (EACH SP)

R2230	SF ROUTINE CODE NUMBER	INTERPRETATION
R2231	00000	OCTAL ONLY
R2232	00001	STRAIGHT FRACTIONAL
R2233	00010	DEGREES (XXX.XX)
R2234	00011	ARITHMETIC SF
R2235	00100	ARITH DP1 OUT(MULT BY 2/14 AT END) IN(STRAIGHT)
R2236	00101	ARITH DP2 OUT(STRAIGHT) IN(SL 7 AT END)
R2237	00110	OPTICS DEGREES(XX.XXX MAX 89.999) OR (XXX.XX MAX 179.99)
R2238	00111	ARITH DP3 OUT (SL 7 AT END) IN (STRAIGHT)
R2239	END OF SF ROUTINE CODE NUMBERS	

R2240	SF CONSTANT CODE NUMBER	INTERPRETATION
R2241	00000	WHOLE
R2242	00000	TIME SEC(XXX.XX)SAME AS WHOLE(ARITH DP1)
R2243	00001	TIME HOURS(XXX.XX) USE ARITH DP2
R2244	00010	DEGREES
R2245	00010	OPTICS DEGREES
R2246	00011	GYRO DEGREES (XX.XXX) USE ARITHDP3
R2247	00100	GYRO BIAS DRIFT .BBXXXXX MILLIRAD/SEC
R2248	00101	GYRO AXIS ACCEL. DRIFT
R2249		.BBXXXXX (MILLIRAD/SEC) / (CM/SEC SEC)
R2250	00110	PIPA BIAS X.XXXX CM/SEC SEC
R2251	00111	PIPA SCALE FACTOR ERROR
R2252		XXXXX. PARTS/MILLION
R2253	01000	POSITION(XXXX.X KILOMETERS) USE ARITHDP3
R2254	01001	VELOCITY(XXXX.X METERS/SEC) USE ARITHDP2
R2255	01010	TIME HOURS(XXX.XX)WEEKS INSIDE(ARITHDP2)
R2256	01011	ELEVATION DEGREES(89.999MAX) USE ARITH
R2257	01100	RENDEZVOUS RADAR RANGE(XXXXXR.FEET)
R2258		USE ARITHDP1
R2259	01101	RENDEZVOUS RADAR RANGE RATE(XXXXX.FT/SEC
R2260		USE ARITHDP1
R2261	01110	LANDING RADAR ALTITUDE(XXXXX.FEET)
R2262		USE ARITHDP1

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```
R2263   01111                   INITIAL/FINAL ALTITUDE(XXXXX.FEET)
R2264                                                   USE ARITHDP1
R2265   10000                   ALTITUDE RATE(XXXXX.FEET)     USE ARITH
R2266   10001                   FORWARD/LATERAL VELOCITY(XXXXX.FEET/SEC)
R2267                                                   USE ARITH
R2268   10010                   ROTATIONAL HAND CONTROLLER ANGLE RATES
R2269                                XXXXX.DEG/SEC      USE ARITH
R2270   10011                   LANDING RADAR VELX(XXXXX.FEET/SEC)
R2271                                                   USE ARITHDP1
R2272   10100                   LANDING RADAR VELY(XXXXX.FEET/SEC)
R2273                                                   USE ARITHDP1
R2274   10101                   LANDING RADAR VELZ(XXXXX.FEET/SEC)
R2275                                                   USE ARITHDP1
R2276   10110                   OPTICAL TRACKER AZIMUTH ANGLE(XXX.XXDEG)
R2277                                                   USE ARITHDP1
R2278   END OF SF CONSTANT CODE NUMBERS


R2279   FOR GREATER THAN SINGLE PRECISION SCALES, PUT ADDRESS OF MAJOR PART INTO
R2280   NOUN TABLES.
R2281   OCTAL LOADS PLACE +0 INTO MAJOR PART, DATA INTO MINOR PART.
R2282   OCTAL DISPLAYS SHOW MINOR PART ONLY.
R2283   TO GET AT BOTH MAJOR AND MINOR PARTS (IN OCTAL), USE NOUN 01.
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P2284 THE FOLLOWING ROUTINES ARE FOR READING THE NOUN TABLES AND THE SF TABLES
R2285 (WHICH ARE IN A SEPARATE BANK FROM THE REST OF PINBALL). THESE READING
R2286 ROUTINES ARE IN THE SAME BANK AS THE TABLES. THEY ARE CALLED BY DXCH Z.

R2287 LODNNTAB LOADS NNADTEM WITH THE NNADTAB ENTRY, NNTYPTEM WITH THE
R2288 NNTYPTAB ENTRY. IF THE NOUN IS MIXED, IDAD1TEM IS LOADED WITH THE FIRST
R2289 IDADDTAB ENTRY, IDAD2TEM THE SECOND IDADDTAB ENTRY, IDAD3TEM THE THIRD
R2290 IDADDTAB ENTRY, RUTMXTEM WITH THE RUTMXTAB ENTRY. MIXBR IS SET FOR
R2291 MIXED OR NORMAL NOUN.

```
2292                                  23,2000          BANK   23
2293  REF   1                 23,2000 52 142 1 LODNNTAB DXCH   IDAD2TEM      SAVE RETURN INFO IN IDAD2TEM, IDAD3TEM.
2294  REF  10 LAST 283        23,2001 50 273 1          INDEX  NOUNREG
2295  REF   1                 23,2002 3 2052 1          CAF    NNADTAB
2296  REF   7 LAST 270        23,2003 54 136 1          TS     NNADTEM
2297  REF  11 LAST 294        23,2004 50 273 1          INDEX  NOUNREG
2298  REF   1                 23,2005 3 2152 0          CAF    NNTYPTAB
2299  REF   5 LAST 269        23,2006 54 137 0          TS     NNTYPTEM
2300  REF  12 LAST 294        23,2007 4 0273 0          CS     NOUNREG
2301  REF   1                 23,2010 6 2036 0          AD     MIXCON
2302                          23,2011 0 0006 1          EXTEND
2303  REF   1                 23,2012 6 2016 1          BZMF   LODMIXNN      NOUN NUMBER G/E FIRST MIXED NOUN
2304  REF  76 LAST 291        23,2013 3 7763 1          CAF    ONE           NOUN NUMBER L/ FIRST MIXED NOUN
2305  REF  12 LAST 273        23,2014 54 130 1          TS     MIXBR         NORMAL.  +1 INTO MIXBR.
2306  REF   1                 23,2015 0 2034 1          TC     LODNLV
2307  REF  35 LAST 291        23,2016 3 7762 0 LODMIXNN CAF    TWO           MIXED.  +2 INTO MIXBR.
2308  REF  13 LAST 294        23,2017 54 130 1          TS     MIXBR
2309  REF  13 LAST 294        23,2020 50 273 1          INDEX  NOUNREG
2310  REF   1                 23,2021 3 2420 0          CAF    RUTMXTAB -55
2311  REF   2 LAST 268        23,2022 54 143 0          TS     RUTMXTEM
2312  REF   1                 23,2023 3 5337 0          CAF    LOW10
2313  REF   8 LAST 294        23,2024 7 0136 1          MASK   NNADTEM
2314  REF 124 LAST 290        23,2025 54 002 1          TS     Q             TEMP
2315  REF 178 LAST 285        23,2026 50 000 1          INDEX  A
2316  REF   1                 23,2027 3 2406 1          CAF    IDADDTAB
2317  REF   4 LAST 269        23,2030 54 140 0          TS     IDAD1TEM      LOAD IDAD1TEM WITH FIRST IDADDTAB ENTRY
2318                          23,2031 0 0006 1          EXTEND
2319  REF 125 LAST 294        23,2032 5 0002 0          INDEX  Q             LOAD IDAD2TEM WITH 2ND IDADDTAB ENTRY
2320  REF   2 LAST 294        23,2033 3 2410 0          DCA    IDADDTAB +1   LOAD IDAD3TEM WITH 3RD IDADDTAB ENTRY.
2321  REF   2 LAST 294        23,2034 52 142 1 LODNLV   DXCH   IDAD2TEM      PUT RETURN INFO INTO A, L.
2322  REF  13 LAST 288        23,2035 52 006 0          DXCH   Z

2323                          23,2036  00055 1 MIXCON   DCT    55            FIRST MIXED NOUN = 55.
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R2324 GTSFOJT LOADS SFTEMP1, SFTEMP2 WITH THE DP SFOJTAB ENTRIES.

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2325  REF  14 LAST 273     23,2037  52 114 1  GTSFOUT  DXCH   SFTEMP1        2X(SFCONUM) ARRIVES IN SFTEMP1.
2326                       23,2040  0 0006 1            EXTEND
2327  REF 179 LAST 294     23,2041  5 0000 1            INDEX  A
2328  REF   1              23,2042  3 2331 1            DCA    SFOUTAB
2329  REF  15 LAST 295     23,2043  52 114 1  SFCOM     DXCH   SFTEMP1
2330  REF  14 LAST 294     23,2044  52 006 0            DXCH   Z


R2331  GTSFIN LOADS SFTEMP1, SFTEMP2 WITH THE DP SFINTAB ENTRIES.

2332  REF  16 LAST 295     23,2045  52 114 1  GTSFIN   DXCH   SFTEMP1        2X(SFCONUM) ARRIVES IN SFTEMP1.
2333                       23,2046  0 0006 1            EXTEND
2334  REF 180 LAST 295     23,2047  5 0000 1            INDEX  A
2335  REF   1              23,2050  3 2253 1            DCA    SFINTAB
2336  REF   1              23,2051  1 2043 0            TCF    SFCOM


A2337                                                                      NN  NORMAL NOUNS
2338                       23,2052  00000 1   NNADTAB   DCT    00000       00 NOT IN USE
2339                       23,2053  40000 0             DCT    40000       01 SPECIFY MACHINE ADDRESS (FRACTIONAL)
2340                       23,2054  40000 0             DCT    40000       02 SPECIFY MACHINE ADDRESS (WHOLE)
2341                       23,2055  40000 0             DCT    40000       03 SPECIFY MACHINE ADDRESS (DEGREES)
2342                       23,2056  40000 0             DCT    40000       04 SPECIFY MACHINE ADDRESS (HOURS)
2343                       23,2057  40000 0             DCT    40000       05 SPECIFY MACHINE ADDRESS (SECONDS)
2344                       23,2060  40000 0             DCT    40000       06 SPECIFY MACHINE ADDRESS (GYRO DEG)
2345                       23,2061  00000 1             DCT    00000       07 SPARE
2346                       23,2062  77776 1             DCT    77776       10 CHANNEL TO BE SPECIFIED
2347                       23,2063  00000 1             DCT    00000       11 SPARE
2348                       23,2064  00000 1             DCT    00000       12 SPARE
2349                       23,2065  00000 1             DCT    00000       13 SPARE
2350                       23,2066  00000 1             DCT    00000       14 SPARE
2351                       23,2067  77777 0             DCT    77777       15 INCREMENT MACHINE ADDRESS
2352  REF   9 LAST 226     23,2070  00024 1             ECADR  TIME2       16 TIME SECONDS
2353  REF  10 LAST 295     23,2071  00024 1             ECADR  TIME2       17 TIME HOURS
2354  REF   8 LAST 223     23,2072  00032 0             ECADR  CDUX        20 ICDU
2355  REF   2 LAST 147     23,2073  00037 0             ECADR  PIPAX       21 PIPAS
2356  REF   5 LAST 216     23,2074  00400 0             ECADR  THETAD      22 NEW ANGLES I
2357  REF   4 LAST 205     23,2075  00342 1             ECADR  DSPTEM2     23 DELTA ANGLES I
2358  REF   8 LAST 284     23,2076  00337 0             ECADR  DSPTEM1     24 DELTA TIME (SEC)
2359  REF   9 LAST 295     23,2077  00337 0             ECADR  DSPTEM1     25 CHECKLIST
2360  REF  10 LAST 295     23,2100  00337 0             ECADR  DSPTEM1     26 PRIO/DELAY, ADRES, BBCON
2361  REF   2 LAST  89     23,2101  01355 0             ECADR  SMODE       27 SELF TEST ON/OFF SWITCH
2362  REF  11 LAST 295     23,2102  00337 0             ECADR  DSPTEM1     30 STAR NUMBERS
2363  REF   1              23,2103  01363 0             ECADR  ALMCADR     31 ALMCADR, ALMCADR +1, ERCOUNT
2364  REF  34 LAST  67     23,2104  02166 1             ECADR  TDEC        32 DECISION TIME (MIDCOURSE)
2365  REF   1              23,2105  02046 1             ECADR  TET         33 EPHEMERIS TIME (MIDCOURSE)
2366  REF   1              23,2106  02174 1             ECADR  MEAS0       34 MEASURED QUANTITY (MIDCOURSE)
2367  REF  12 LAST 295     23,2107  00337 0             ECADR  DSPTEM1     35 INBIT MESSAGE
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2368	REF	1	23,2110	01500 0		ECADR	LANDMARK	36 LANDMARK DATA 1
2369	REF	2 LAST 296	23,2111	01503 0		ECADR	LANDMARK +3	37 LANDMARK DATA 2
2370	REF	7 LAST 189	23,2112	00035 1		ECADR	OPTY	40 RENDEZVOUS RADAR ANGLES (TRUN, SHAFT)
2371	REF	15 LAST 185	23,2113	00422 0		ECADR	TANG	41 NEW REND. RADAR ANGLES (TRUN, SHAFT)
2372	REF	5 LAST 295	23,2114	00342 1		ECADR	DSPTEM2	42 AOT ROTATION ANGLES
2373	REF	8 LAST 167	23,2115	00374 1		ECADR	XYMARK	43 AOT DETENT CODE
2374	REF	3 LAST 110	23,2116	00357 0		ECADR	FORVEL	44 FORWARD VELOCITY, LATERAL VELOCITY
2375	REF	1	23,2117	03031 0		ECADR	PCDU	45 ROTATIONAL HAND CONTROLLER ANGLE RATE
2376			23,2120	00000 1		OCT	00000	46 SPARE
2377			23,2121	00000 1		OCT	00000	47 SPARE
2378	REF	7 LAST 246	23,2122	01360 0		ECADR	FAILREG	50 FAILREG, FAILREG +1, FAILREG +2.
2379			23,2123	00000 1		OCT	00000	51 SPARE
2380	REF	1	23,2124	01444 1		ECADR	GBIASX	52 GYRO BIAS DRIFT
2381	REF	1	23,2125	01447 1		ECADR	ADIAX	53 GYRO INPUT AXIS ACCELERATION DRIFT
2382	REF	1	23,2126	01452 0		ECADR	ADSRAX	54 GYRO SPIN AXIS ACCELERATION DRIFT
A2383								NN MIXED NOUNS
2384			23,2127	02000 0		OCT	02000	55 LANDING RADAR ALTITUDE, TIME(SEC)
2385			23,2130	02002 1		OCT	02002	56 LANDING RADAR VELX, TIME(SEC)
2386			23,2131	02004 1		OCT	02004	57 LANDING RADAR VELY, TIME(SEC)
2387			23,2132	02006 0		OCT	02006	60 LANDING RADAR VELZ, TIME(SEC)
2388			23,2133	02010 1		OCT	02010	61 TARGET AZIMUTH AND ELEVATION
2389			23,2134	04012 0		OCT	04012	62 RENDEZVOUS RADAR RANGE, TRUN, SHAFT
2390			23,2135	04015 1		OCT	04015	63 REND. RADAR RANGE RATE, TRUN, SHAFT
2391			23,2136	04020 1		OCT	04020	64 INITIAL ALT, FINAL ALT, ALT RATE
2392			23,2137	02023 1		OCT	02023	65 SAMPLED TIME (HOURS AND SECONDS)
A2393								(FETCHED IN INTERRUPT)
2394			23,2140	04025 1		OCT	04025	66 SYSTEM TEST RESULTS
2395			23,2141	04030 0		OCT	04030	67 DELTA GYRO ANGLES
2396			23,2142	02033 0		OCT	02033	70 OPTICAL TRACKER ANGLES (AZIMUTH,ELEV)
2397			23,2143	02035 0		OCT	02035	71 DESIRED OPT. TRACK. ANGLES (AZ, ELEV)
2398			23,2144	04037 1		OCT	04037	72 DELTA POSITION
2399			23,2145	04042 0		OCT	04042	73 DELTA VELOCITY
2400			23,2146	04045 1		OCT	04045	74 MEASUREMENT DATA (MIDCOURSE)
2401			23,2147	04050 0		OCT	04050	75 MEASUREMENT DEVIATIONS (MIDCOURSE)
2402			23,2150	04053 0		OCT	04053	76 POSITION VECTOR
2403			23,2151	04056 0		OCT	04056	77 VELOCITY VECTOR
A2404								NN NORMAL NOUNS
2405			23,2152	00000 1	NNTYPTAB	OCT	00000	00 NOT IN USE
2406			23,2153	00040 0		OCT	00040	01 1COMP FRACTIONAL
2407			23,2154	00140 1		OCT	00140	02 1COMP WHOLE
2408			23,2155	00102 1		OCT	00102	03 1COMP DEGREES
2409			23,2156	00241 0		OCT	00241	04 1COMP HOURS
2410			23,2157	00200 0		OCT	00200	05 1COMP SECONDS
2411			23,2160	00343 0		OCT	00343	06 1COMP GYRO DEGREES
2412			23,2161	00000 1		OCT	00000	07 SPARE
2413			23,2162	00000 1		OCT	00000	10 1COMP OCTAL ONLY

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2414	23,2163	00000 1	OCT	00000	11		SPARE
2415	23,2164	00000 1	OCT	00000	12		SPARE
2416	23,2165	00000 1	OCT	00000	13		SPARE
2417	23,2166	00000 1	OCT	00000	14		SPARE
2418	23,2167	00000 1	OCT	00000	15	1COMP	OCTAL ONLY
2419	23,2170	00200 0	OCT	00200	16	1COMP	SECONDS
2420	23,2171	00241 0	OCT	00241	17	1COMP	HOURS
2421	23,2172	04102 0	OCT	04102	20	3COMP	DEGREES
2422	23,2173	04140 0	OCT	04140	21	3COMP	WHOLE
2423	23,2174	04102 0	OCT	04102	22	3COMP	DEGREES
2424	23,2175	04102 0	OCT	04102	23	3COMP	DEGREES
2425	23,2176	00200 0	OCT	00200	24	1COMP	SECONDS
2426	23,2177	00140 1	OCT	00140	25	1COMP	WHOLE
2427	23,2200	04000 0	OCT	04000	26	3COMP	OCTAL ONLY
2428	23,2201	00140 1	OCT	00140	27	1COMP	WHOLE
2429	23,2202	04140 0	OCT	04140	30	3COMP	WHOLE
2430	23,2203	04000 0	OCT	04000	31	3COMP	OCTAL ONLY
2431	23,2204	00252 1	OCT	00252	32	1COMP	TIME WEEKS
2432	23,2205	00252 1	OCT	00252	33	1COMP	TIME WEEKS
2433	23,2206	00350 1	OCT	00350	34	1COMP	POSITION
2434	23,2207	04000 0	OCT	04000	35	3COMP	OCTAL ONLY
2435	23,2210	04000 0	OCT	04000	36	3COMP	OCTAL ONLY
2436	23,2211	04000 0	OCT	04000	37	3COMP	OCTAL ONLY
2437	23,2212	02102 0	OCT	02102	40	2COMP	DEGREES
2438	23,2213	02102 0	OCT	02102	41	2COMP	DEGREES
2439	23,2214	02102 0	OCT	02102	42	2COMP	DEGREES
2440	23,2215	00140 1	OCT	00140	43	1COMP	WHOLE
2441	23,2216	02161 0	OCT	02161	44	2COMP	FORWARD/LATERAL VELOCITY
2442	23,2217	04162 0	OCT	04162	45	3COMP	ROT HAND CONT ANGLE RATE
2443	23,2220	00000 1	OCT	00000	46		SPARE
2444	23,2221	00000 1	OCT	00000	47		SPARE
2445	23,2222	04000 0	OCT	04000	50	3COMP	OCTAL ONLY
2446	23,2223	00000 1	OCT	00000	51		SPARE
2447	23,2224	04144 1	OCT	04144	52	3COMP	GYRO BIAS DRIFT
2448	23,2225	04145 0	OCT	04145	53	3COMP	GYRO AXIS ACCEL. DRIFT
2449	23,2226	04145 0	OCT	04145	54	3COMP	GYRO AXIS ACCEL. DRIFT
A2450					NN		MIXED NOUNS
2451	23,2227	00016 0	OCT	00016	55	2COMP	LANDING RADAR ALT, SECONDS
2452	23,2230	00023 0	OCT	00023	56	2COMP	LANDING RADAR VELX, SECONDS
2453	23,2231	00024 1	OCT	00024	57	2COMP	LANDING RADAR VELY, SECONDS
2454	23,2232	00025 0	OCT	00025	60	2COMP	LANDING RADAR VELZ, SECONDS
2455	23,2233	00542 1	OCT	00542	61	2COMP	DEGREES, ELEVATION DEGREES
2456	23,2234	04114 1	OCT	04114	62	3COMP	REND. RADAR RANGE, DEG, DEG
2457	23,2235	04115 0	OCT	04115	63	3COMP	REND. RAD. RANGE RATE, DEG,DEG
2458	23,2236	40757 0	OCT	40757	64	3COMP	IN/FN ALT, IN/FN ALT, ALT RATE
2459	23,2237	00001 0	OCT	00001	65	2COMP	HOURS, SECONDS
2460	23,2240	00000 1	OCT	00000	66	3COMP	WHOLE, FRACTIONAL, WHOLE
2461	23,2241	06143 1	OCT	06143	67	3COMP	GYRO DEGREES FOR EACH
2462	23,2242	00126 1	OCT	00126	70	2COMP	OPT TRACK AZIMUTH, DEGREES

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2463                23,2243  00126 1          OCT   00126      71 2COMP  OPT TRACK AZIMUTH, DEGREES
2464                23,2244  20410 0          OCT   20410      72 3COMP  POSITION FOR EACH
2465                23,2245  22451 1          OCT   22451      73 3COMP  VELOCITY FOR EACH
2466                23,2246  00412 0          OCT   00412      74 3COMP  TIME WEEKS, POSITION, WHOLE
2467                23,2247  20450 1          OCT   20450      75 3COMP  POSITION, VELOCITY, POSITION
2468                23,2250  20410 0          OCT   20410      76 3COMP  POSITION FOR EACH
2469                23,2251  22451 1          OCT   22451      77 3COMP  VELOCITY FOR EACH


2470                23,2252  00006 1  SFINTAB OCT   00006      WHOLE,TIME(SEC)
2471                23,2253  03240 1          OCT   03240
2472                23,2254  00253 0          OCT   00253      TIME HOURS ( = 1,3,,,,, )
2473                23,2255  25124 1          OCT   25124        (POINT BETWEEN BITS 7-8 )
2474                23,2256  00000 1          OCT   0          DEGREES (SFCON IN DEGINSF )
2475                23,2257  00000 1          OCT   0
2476                23,2260  10707 0          OCT   10707      GYRO DEGREES
2477                23,2261  03435 0          OCT   03435                UPPED BY 1
2478                23,2262  00001 0          OCT   00001      GYRO BIAS DRIFT
2479                23,2263  02133 1          OCT   02133
2480                23,2264  00011 1          OCT   00011      GYRO AXIS ACCEL, DRIFT
2481                23,2265  30322 1          OCT   30322
2482                23,2266  00004 0          OCT   00004      PIPA BIAS
2483                23,2267  14021 1          OCT   14021
2484                23,2270  00314 1          OCT   00314      PIPA SCALE ERROR,
2485                23,2271  31463 1          OCT   31463
2486                23,2272  23420 0          OCT   23420      POSITION
2487                23,2273  00000 1          OCT   00000
2488                23,2274  00201 1          OCT   00201      VELOCITY
2489                23,2275  30327 1          OCT   30327      ( POINT BETWEEN BITS 7-8 )
2490                23,2276  01371 0          OCT   01371      TIME WEEKS
2491                23,2277  34750 1          OCT   34750      ( POINT BETWEEN BITS 7-8 )
2492                23,2300  00001 0          OCT   00001      ELEVATION DEGREES
2493                23,2301  03434 1          OCT   03434
2494                23,2302  00006 1          OCT   00006      RENDEZVOUS RADAR RANGE
2495                23,2303  20162 0          OCT   20162
2496                23,2304  00011 1          OCT   00011      RENDEZVOUS RADAR RANGE RATE
2497                23,2305  27066 1          OCT   27066
2498                23,2306  00005 1          OCT   00005      LANDING RADAR ALTITUDE
2499                23,2307  24733 0          OCT   24733
2500                23,2310  00002 0          OCT   00002      INITIAL/FINAL ALTITUDE
2501                23,2311  23224 1          OCT   23224
2502                23,2312  00014 1          OCT   00014      ALTITUDE RATE
2503                23,2313  06500 1          OCT   06500
2504                23,2314  00012 1          OCT   00012      FORWARD/LATERAL VELOCITY
2505                23,2315  36455 0          OCT   36455
2506                23,2316  04256 1          OCT   04256      ROT HAND CONT ANGLE RATE
2507                23,2317  07071 0          OCT   07071
2508                23,2320  00011 1          OCT   00011      LANDING RADAR VELX
2509                23,2321  17410 1          OCT   17410
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2510                23,2322  00004 0        OCT   00004    LANDING RADAR VELY
2511                23,2323  33740 1        OCT   33740
2512                23,2324  00007 0        OCT   00007    LANDING RADAR VELZ
2513                23,2325  03701 1        OCT   03701
2514                23,2326  00005 1        OCT   00005    OPTICAL AZIMUTH TRACKER ANGLE
2515                23,2327  21616 0        OCT   21616
A2516                                                      END OF SFINTAB


2517                23,2330  05174 0 SFOUTA3 OCT  05174    WHOLE, TIME(SEC)
2518                23,2331  13261 0        OCT   13261
2519                23,2332  27670 0        OCT   27670    TIME HOURS
2520                23,2333  31357 1        OCT   31357
2521                23,2334  00000 1        OCT   0        DEGREES
2522                23,2335  00000 1        OCT   0
2523                23,2336  00714 0        OCT   00714    GYRO DEGREES
2524                23,2337  31463 1        OCT   31463    (POINT BETWEEN BITS 7-8)
2525                23,2340  35753 0        OCT   35753    GYRO BIAS DRIFT
2526                23,2341  32323 1        OCT   32323
2527                23,2342  03216 1        OCT   03216    GYRO AXIS ACCEL. DRIFT
2528                23,2343  06400 0        OCT   06400
2529                23,2344  07237 0        OCT   07237    PIPA BIAS
2530                23,2345  37776 0        OCT   37776
2531                23,2346  00120 1        OCT   00120    PIPA SCALE ERROR
2532                23,2347  00000 1        OCT   00000
2533                23,2350  00321 1        OCT   00321    POSITION
2534                23,2351  26706 1        OCT   26706    ( POINT BETWEEN BITS 7-8 )
2535                23,2352  37441 1        OCT   37441    VELOCITY
2536                23,2353  14247 0        OCT   14247
2537                23,2354  05300 1        OCT   05300    TIME WEEKS
2538                23,2355  20305 0        OCT   20305
2539                23,2356  34631 1        OCT   34631    ELEVATION DEGREES
2540                23,2357  23146 0        OCT   23146
2541                23,2360  04725 0        OCT   04725    RENDEZVOUS RADAR RANGE
2542                23,2361  35454 1        OCT   35454
2543                23,2362  03225 1        OCT   03225    RENDEZVOUS RADAR RANGE RATE
2544                23,2363  07470 0        OCT   07470
2545                23,2364  05521 1        OCT   05521    LANDING RADAR ALTITUDE
2546                23,2365  30260 0        OCT   30260
2547                23,2366  14226 1        OCT   14226    INITIAL/FINAL ALTITUDE
2548                23,2367  31757 0        OCT   31757
2549                23,2370  02476 0        OCT   02476    ALTITUDE RATE
2550                23,2371  05531 0        OCT   05531
2551                23,2372  02727 1        OCT   02727    FORWARD/LATERAL VELOCITY
2552                23,2373  16415 0        OCT   16415
2553                23,2374  00007 0        OCT   00007    ROT HAND CONT ANGLE RATE
2554                23,2375  13734 0        OCT   13734
2555                23,2376  03277 0        OCT   03277    LANDING RADAR VELX
2556                23,2377  14165 0        OCT   14165
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 2557                          23,2400  06442 0        OCT   06442          LANDING RADAR VELY
 2558                          23,2401  04735 1        OCT   04735
 2559                          23,2402  04374 0        OCT   04374          LANDING RADAR VELZ
 2560                          23,2403  30251 1        OCT   30251
 2561                          23,2404  05605 1        OCT   05605          OPTICAL TRACKER AZIMUTH ANGLE
 2562                          23,2405  03656 1        OCT   03656
A2563                                                                       END OF SFOUTAB


A2564                                                                       MIXNOUN  SF ROUT
 2565  REF   4 LAST 198       23,2406  03471 0  IDADDTAB ECADR RSTACK  +18D    01     LANDING RADAR ALTITUDE
 2566  REF   5 LAST 300       23,2407  03475 1           ECADR RSTACK  +22D    01     SECONDS
 2567  REF   6 LAST 300       23,2410  03447 0           ECADR RSTACK          02     LANDING RADAR VELX
 2568  REF   7 LAST 300       23,2411  03453 0           ECADR RSTACK  +4      02     SECONDS
 2569  REF   8 LAST 300       23,2412  03455 0           ECADR RSTACK  +6      03     LANDING RADAR VELY
 2570  REF   9 LAST 300       23,2413  03461 1           ECADR RSTACK  +10D    03     SECONDS
 2571  REF  10 LAST 300       23,2414  03463 0           ECADR RSTACK  +12D    04     LANDING RADAR VELZ
 2572  REF  11 LAST 300       23,2415  03467 1           ECADR RSTACK  +16D    04     SECONDS
 2573  REF  13 LAST 295       23,2416  00337 0           ECADR DSPTEM1         05     DEGREES
 2574  REF  14 LAST 300       23,2417  00340 0           ECADR DSPTEM1 +1      05     ELEVATION DEGREES
 2575  REF  12 LAST 300       23,2420  03447 0           ECADR RSTACK          06     RENDEZVOUS RADAR RANGE
 2576  REF  13 LAST 300       23,2421  03451 1           ECADR RSTACK  +2      06     DEGREES
 2577  REF  14 LAST 300       23,2422  03452 1           ECADR RSTACK  +3      06     DEGREES
 2578  REF  15 LAST 300       23,2423  03455 0           ECADR RSTACK  +6      07     RENDEZVOUS RADAR RANGE RATE
 2579  REF  16 LAST 300       23,2424  03457 1           ECADR RSTACK  +8D     07     DEGREES
 2580  REF  17 LAST 300       23,2425  03460 0           ECADR RSTACK  +9D     07     DEGREES
 2581  REF   6 LAST 222       23,2426  00351 0           ECADR ALT             10     INITIAL/FINAL ALTITUDE
 2582  REF   3 LAST 222       23,2427  00354 0           ECADR FINALT          10     INITIAL/FINAL ALTITUDE
 2583  REF   6 LAST 222       23,2430  00353 1           ECADR ALTRATE         10     ALTITUDE RATE
 2584  REF   1                23,2431  00013 0           ECADR SAMPTIME        11     HOURS
 2585  REF   2 LAST 300       23,2432  00013 0           ECADR SAMPTIME        11     SECONDS
 2586  REF   6 LAST 296       23,2433  00342 1           ECADR DSPTEM2         12     WHOLE
 2587  REF   7 LAST 300       23,2434  00343 0           ECADR DSPTEM2 +1      12     FRACTIONAL
 2588  REF   8 LAST 300       23,2435  00344 1           ECADR DSPTEM2 +2      12     WHOLE
 2589  REF   5 LAST 208       23,2436  00403 0           ECADR DELVX           13     GYRO DEGREES
 2590  REF   6 LAST 300       23,2437  00405 0           ECADR DELVX   +2       13     GYRO DEGREES
 2591  REF   7 LAST 300       23,2440  00407 1           ECADR DELVX   +4       13     GYRO DEGREES
 2592  REF   1                23,2441  01475 0           ECADR AZANG           14     OPT TRACK AZIMUTH ANGLE
 2593  REF   1                23,2442  01475 0           ECADR ELANG           14     DEGREES
 2594  REF   1                23,2443  01475 0           ECADR DESLOTSY        15     OPT TRACK AZIMUTH ANGLE
 2595  REF   1                23,2444  01475 0           ECADR DESLOTSX        15     DEGREES
 2596  REF   1                23,2445  02052 1           ECADR DELR            16     POSITION
 2597  REF   2 LAST 300       23,2446  02054 1           ECADR DELR    +2      16     POSITION
 2598  REF   3 LAST 300       23,2447  02056 0           ECADR DELR    +4      16     POSITION
 2599  REF   1                23,2450  02060 0           ECADR DELVEL          17     VELOCITY
 2600  REF   2 LAST 300       23,2451  02062 1           ECADR DELVEL  +2      17     VELOCITY
 2601  REF   3 LAST 300       23,2452  02064 1           ECADR DELVEL  +4      17     VELOCITY
 2602  REF  35 LAST 295       23,2453  02166 1           ECADR TDEC            20     TIME WEEKS
 2603  REF   2 LAST 295       23,2454  02174 1           ECADR MEASQ           20     POSITION
```

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```
2604   REF   1                  23,2455  02200 1          ECADR  MEASMODE          20      WHOLE
2605   REF  15 LAST 300         23,2456  00337 0          ECADR  DSPTEM1           21      POSITION
2606   REF  16 LAST 301         23,2457  00341 1          ECADR  DSPTEM1 +2        21      VELOCITY
2607   REF   1                  23,2460  02176 0          ECADR  DELTAQ            21      POSITION
2608   REF  17 LAST 301         23,2461  00337 0          ECADR  DSPTEM1           22      POSITION
2609   REF  18 LAST 301         23,2462  00341 1          ECADR  DSPTEM1 +2        22      POSITION
2610   REF  19 LAST 301         23,2463  00343 0          ECADR  DSPTEM1 +4        22      POSITION
2611   REF  20 LAST 301         23,2464  00337 0          ECADR  DSPTEM1           23      VELOCITY
2612   REF  21 LAST 301         23,2465  00341 1          ECADR  DSPTEM1 +2        23      VELOCITY
2613   REF  22 LAST 301         23,2466  00343 0          ECADR  DSPTEM1 +4        23      VELOCITY
2614                            23,2467  00000 1          OCT    00000                     SPARE
2615                            23,2470  00000 1          OCT    00000                     SPARE
2616                            23,2471  00000 1          OCT    00000                     SPARE
2617                            23,2472  00000 1          OCT    00000                     SPARE
2618                            23,2473  00000 1          OCT    00000                     SPARE
2619                            23,2474  00000 1          OCT    00000                     SPARE
A2620                                                                      END OF IDADDTAB
```

```
A2621                                                                      MIXNOUN  SF ROUT
2622                            23,2475  00204 1  RUTMXTAB OCT    00204   01  LANDING RADAR ALTITUDE, SECONDS
2623                            23,2476  00204 1           OCT    00204   02  LANDING RADAR VELX, SECONDS
2624                            23,2477  00204 1           OCT    00204   03  LANDING RADAR VELY, SECONDS
2625                            23,2500  00204 1           OCT    00204   04  LANDING RADAR VELZ, SECONDS
2626                            23,2501  00142 0           OCT    00142   05  DEGREES, ELEVATION DEGREES
2627                            23,2502  04104 0           OCT    04104   06  RENDEZVOUS RADAR RANGE, DEG, DEG
2628                            23,2503  04104 0           OCT    04104   07  REND. RADAR RANGE RATE, DEG, DEG
2629                            23,2504  06204 1           OCT    06204   10  INIT/FIN ALT, INIT/FIN ALT, ALT RATE
2630                            23,2505  00205 0           OCT    00205   11  HOURS, SECONDS
2631                            23,2506  06043 0           OCT    06043   12  WHOLE, FRACTIONAL, WHOLE
2632                            23,2507  16347 0           OCT    16347   13  GYRO DEGREES (FOR EACH)
2633                            23,2510  00104 1           OCT    00104   14  OPT TRACK AZIMUTH ANGLE, DEGREES
2634                            23,2511  00104 1           OCT    00104   15  OPT TRACK AZIMUTH ANGLE, DEGREES
2635                            23,2512  16347 0           OCT    16347   16  POSITION (FOR EACH)
2636                            23,2513  12245 1           OCT    12245   17  VELOCITY (FOR EACH)
2637                            23,2514  06345 0           OCT    06345   20  TIME WEEKS, POSITION, WHOLE
2638                            23,2515  16247 1           OCT    16247   21  POSITION, VELOCITY, POSITION
2639                            23,2516  16347 0           OCT    16347   22  POSITION (FOR EACH)
2640                            23,2517  12245 1           OCT    12245   23  VELOCITY (FOR EACH)
A2641                                                                      END OF RUTMXTAB
```

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P2642 MISCELLANEOUS SERVICE ROUTINES IN FIXED/FIXED

```
 2643                                    4513          BLOCK  02
R2644  SETNCADR        E CADR ARRIVES IN A. IT IS STORED IN NOUNCADR. EBANK BITS
R2645                  ARE SET. E ADRES IS DERIVED AND PUT INTO NOUNADD.

 2646  REF   7 LAST 277        4513  54 310 1  SETNCADR TS      NOUNCADR        STORE ECADR
 2647  REF  13 LAST 226        4514  54 003 0           TS      EBANK           SET EBANK BITS
 2648  REF   4 LAST 153        4515  7 4564 0           MASK    LOW8
 2649  REF   3 LAST  71        4516  6 5352 0           AD      OCT1400
 2650  REF  24 LAST 273        4517  54 135 1           TS      NOUNADD         PUT E ADRES INTO NOUNADD
 2651  REF 126 LAST 294        4520  0 0002 0           TC      Q

R2652  SETNADD        GETS E CADR FROM NOUNCADR, SETS EBANK BITS, DERIVES
R2653                  E ADRES AND PUTS IT INTO NOUNADD.

 2654  REF   8 LAST 302        4521  3 0310 0  SETNADD  CA      NOUNCADR
 2655  REF   6 LAST 269        4522  1 4514 1           TCF     SETNCADR +1

R2656  SETEBANK       E CADR ARRIVES IN A. EBANK BITS ARE SET. E ADRES IS
R2657                  DERIVED AND LEFT IN A.

 2658  REF  14 LAST 302        4523  54 003 0  SETEBANK TS      EBANK           SET EBANK BITS
 2659  REF   5 LAST 302        4524  7 4564 0           MASK    LOW8
 2660  REF   4 LAST 302        4525  6 5352 0           AD      OCT1400         E ADRES LEFT IN A
 2661  REF 127 LAST 302        4526  0 0002 0           TC      Q

 2662                           4527    00016 0  R1D1    OCT     16
 2663                           4530    00011 1  R2D1    OCT     11
 2664                           4531    00004 0  R3D1    OCT     4

 2665  REF  11 LAST 288        4532  54 020 1  RIGHT5   TS      CYR
 2666  REF  12 LAST 302        4533  4 0020 1           CS      CYR
 2667  REF  13 LAST 302        4534  4 0020 1           CS      CYR
 2668  REF  14 LAST 302        4535  4 0020 1           CS      CYR
 2669  REF  15 LAST 302        4536  4 0020 1           CS      CYR
 2670  REF  16 LAST 302        4537  56 020 0           XCH     CYR
 2671  REF 128 LAST 302        4540  0 0002 0           TC      Q

 2672  REF  12 LAST 280        4541  54 022 0  LEFT5    TS      CYL
 2673  REF  13 LAST 302        4542  4 0022 0           CS      CYL
 2674  REF  14 LAST 302        4543  4 0022 0           CS      CYL
```

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```
2675  REF  15 LAST 302      4544  4 0022 0          CS     CYL
2676  REF  16 LAST 303      4545  4 0022 0          CS     CYL
2677  REF  17 LAST 303      4546  56 022 1          XCH    CYL
2678  REF 129 LAST 302      4547  0 0002 0          TC     Q

2679                         4550  6 0000 1  SLEFT5   DOUBLE
2680                         4551  6 0000 1          DOUBLE
2681                         4552  6 0000 1          DOUBLE
2682                         4553  6 0000 1          DOUBLE
2683                         4554  6 0000 1          DOUBLE
2684  REF 130 LAST 303       4555  0 0002 0          TC     Q


2685                         4556  00037 0  LOW5     OCT    37
2686                         4557  01740 0  MID5     OCT    1740
2687                         4560  76000 0  HI5      OCT    76000        MUST STAY HERE

2688  REF   1                      5723  TSNOVAC  =      SVCTR +5
2689  REF  30 LAST 276       4561  0 5663 1  TCWAIT   TC     WAITLIST
2690  REF   2 LAST 303             5717  TCTSKOVR =      SVCTR +1
2691  REF   7 LAST 210       4562  0 5516 0  TCFINDVC TC     FINDVAC


2692  REF   2 LAST  77             5210  CHRPRIO  =      PRIO30       EXEC PRIORITY OF CHARIN

2693                         4563  03777 0  LOW11    OCT    3777
2694  REF   7 LAST 269             4563  B12-1    EQUALS LOW11
2695                         4564  00377 1  LOW8     OCT    377
2696                         4565  00023 0  MD1      OCT    23
2697                         4566  00021 1  ND1      OCT    21
2698                         4567  00025 0  MD1      OCT    25

2699                         4570  00012 1  BINCON   DEC    10

2700  REF  18 LAST 248       4571  3 7755 1  FALTON   CA     BIT7         TURN ON OPERATOR ERROR LIGHT
2701                         4572  0 0006 1          EXTEND
2702  REF   5 LAST 284       4573  05 011 1          WOR    DSALMOUT     BIT 7 OF CHANNEL 11
2703  REF 131 LAST 303       4574  0 0002 0          TC     Q

2704  REF  19 LAST 303       4575  4 7755 0  FALTOF   CS     BIT7         TURN OFF OPERATOR ERROR LIGHT
2705                         4576  0 0006 1          EXTEND
2706  REF   6 LAST 303       4577  03 011 1          WAND   DSALMOUT     BIT 7 OF CHANNEL 11
2707  REF 132 LAST 303       4600  0 0002 0          TC     Q

2708  REF  11 LAST 201       4601  3 7757 0  RELDSPON CAF    BIT5         TURN ON KEY RELEASE LIGHT
2709                         4602  0 0006 1          EXTEND
2710  REF   7 LAST 303       4603  05 011 1          WOR    DSALMOUT     BIT 5 OF CHANNEL 11
2711  REF 133 LAST 303       4604  0 0002 0          TC     Q
```

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```
2712                          4605  0 0006 1  LODSAMPT EXTEND
2713  REF  11 LAST 295        4606  3 0025 0          DCA     TIME2
2714  REF   3 LAST 300        4607  52 014 0          DXCH    SAMPTIME
2715  REF 134 LAST 303        4610  0 0002 0          TC      Q


2716                          4611  0 0006 1  TPSL1    EXTEND                  SHIFTS MPAC, +1, +2 LEFT 1
2717  REF 177 LAST 288        4612  3 0146 1          DCA     MPAC    +1      LEAVES OVFIND SET TO +/- 1 FOR OF/UF
2718  REF 178 LAST 304        4613  20 146 0          DAS     MPAC    +1
2719  REF 179 LAST 304        4614  6 0144 0          AD      MPAC
2720  REF 180 LAST 304        4615  26 144 1          ADS     MPAC
2721                          4616  54 007 1          TS      7               TS A DOES NOT CHANGE A ON OF/UF.
2722  REF 135 LAST 304        4617  0 0002 0          TC      Q               NO NET OF/UF
2723  REF   7 LAST 274        4620  54 111 1          TS      OVFIND          OVFIND SET TO +/- 1 FOR OF/UF
2724  REF 136 LAST 304        4621  0 0002 0          TC      Q


2725  REF  19 LAST 216        4622  3 7756 1  FLASHON  CAF     BIT6            TURN ON V/N FLASH
2726                          4623  0 0006 1          EXTEND                  BIT 6 OF CHANNEL 11
2727  REF   8 LAST 303        4624  05 011 1          WOR     DSALMOUT
2728  REF 137 LAST 304        4625  0 0002 0          TC      Q


2729  REF  20 LAST 304        4626  4 7756 0  FLASHOFF CS      BIT6            TURN OFF V/N FLASH
2730                          4627  0 0006 1          EXTEND
2731  REF   9 LAST 304        4630  03 011 1          WAND    DSALMOUT        BIT 6 OF CHANNEL 11
2732  REF 138 LAST 304        4631  0 0002 0          TC      Q
```

```
P2733   INTERNAL ROUTINES THAT USE THE KEYBOARD AND DISPLAY SYSTEM(THRU
R2734   NVSUB) MUST  TC GRABDSP  BEFOREHAND , TO GRAB THE DISPLAY SYSTEM AND
R2735   MAKE IT BUSY TO OTHER INTERNAL USERS.

R2736         WHEN FINISHED , THERE MUST BE A TC FREEDSP , TO RELEASE THE
R2737   SYSTEM FOR OTHER INTERNAL USERS.

R2738         THE CALLING SEQUENCES ARE
R2739   L        TC     GRABDSP
R2740   L+1      RETURN HERE WHEN SYSTEM IS ALREADY GRABBED
R2741   L+2      RETURN HERE MEANS YOU HAVE IT

R2742   L        TC     NVSUB
R2743   L+1      RETURN HERE IF OPERATOR HAS INTERVENED
R2744   L+2      RETURN HERE AFTER EXECUTION


R2745         A ROUTINE CALLED GRABUSY IS PROVIDED (USE IS OPTIONAL) TO PUT YOUR
R2746   JOB TO SLEEP UNTIL  THE SYSTEM IS FREED BY THE JOB HOLDING IT.
R2747   GRABUSY CANNOT BE CALLED FROM E MEMORY, SINCE JOBSLEEP AND JOBWAKE
R2748   HANDLE ONLY FIXED MEMORY.
R2749   YOUR CADR IS PUT AT FIRST AVAILABLE SLOT IN A WAITING LIST (FIFO).

R2750         THE CALLING SEQUENCE IS
R2751            CAF     WAKEFCADR
R2752            TC      GRABUSY

R2753         A ROUTINE CALLED  NVSUBUSY IS PROVIDED (USE IS OPTIONAL)  TO PUT
R2754   YOUR JOB TO SLEEP UNTIL THE OPERATOR RELEASES IT.
R2755   NVSUBUSY CANNOT BE CALLED FROM E MEMORY, SINCE JOBSLEEP AND JOBWAKE
R2756   HANDLE ONLY FIXED MEMORY.
R2757                                                YOUR CADR IS PUT
R2758   ON TOP OF A WAITING LIST (FIFO). IT ALSO TURNS ON KEY RELEASE LIGHT.

R2759          THE CALLING SEQUENCE IS
R2760            CAF     WAKEFCADR
R2761            TC      NVSUBUSY


R2762   AFTER A TC FREEDSP, THE INTERNAL INTERLOCK IS KEPT BUSY FOR 1.75 SECS.
R2763   AFTER WHICH A CADR IS CALLED FROM THE LIST. THIS INSURES THAT ALL
R2764   DISPLAYS WAITING WILL BE VISIBLE.


R2765   GRABLOCK IS THE INTERNAL INTERLOCK FOR THE USE OF THE KEYBOARD
R2766   AND DISPLAY SYSTEM.
R2767   +0  FREE
```

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R2768 +1 SOME INTERNAL ROUTINE HAS GRABBED DSP SYST
R2769 +2 SOME INTERNAL ROUTINE HAS GONE TO NVSUBUSY

```
2770  REF   3 LAST 275        4632  10 330 0  GRABDSP  CCS    GRABLOCK
2771  REF 139 LAST 304        4633  0 0002 0           TC     Q              ALREADY GRABBED, RETURN TO L+1
2772  REF  77 LAST 294        4634  3 7763 1           CAF    ONE            NOT GRABBED, SET TO +1
2773  REF   4 LAST 306        4635  54 330 0           TS     GRABLOCK       AND RETURN TO L+2
2774  REF   4 LAST 290        4636  1 7015 0           TCF    Q+1

2775  REF   2 LAST 294        4637  3 5337 0  PREGBSY  CAF    LOW10          SPECIAL ENTRANCE FOR ROUTINES IN FIXED
2776  REF 140 LAST 306        4640  7 0002 1           MASK   Q              BANKS ONLY DESIRING THE FCADR OF
2777  REF   2 LAST 289        4641  6 0004 0           AD     FBANK          1 + (LOC FROM WHICH TC PREGBSY WAS DONE)
2778  REF  22 LAST 282        4642  0 5225 1  GRABUSY  TC     POSTJUMP       TO BE ENTERED.
2779  REF   1                 4643   10000 0           CADR   GRABUSYB
2780  REF   2 LAST 290                04,3472          SETLOC DOPROG  +2
2781  REF  61 LAST 290      04,3472   54 001 1  GRABUSY1 TS     L
2782  REF   5 LAST 306      04,3473   10 330 0           CCS    GRABLOCK
2783                        04,3474   0 3477 0           TC     +3             STILL GRABBED
2784  REF  62 LAST 306      04,3475   3 0001 0           CA     L              NOT GRABBED SO DO DIRECT CALL
2785  REF  10 LAST 282      04,3476   0 5230 0           TC     BANKJUMP
2786  REF  36 LAST 294      04,3477   3 7762 0           CAF    TWO
2787  REF   1               04,3500   54 134 0           TS     LSTPTR
2788  REF   2 LAST 306      04,3501   50 134 1           INDEX  LSTPTR         SEARCH LIST FOR FIRST AVAILABLE SPACE
2789  REF   4 LAST  98      04,3502   10 333 0           CCS    DSPLIST        FROM BOTTOM.
2790                        04,3503   0 3505 1           TC     +2
2791  REF   1               04,3504   0 3510 0           TC     PUTINLST       SPACE FOUND
2792  REF   3 LAST 306      04,3505   10 134 0           CCS    LSTPTR         DECREMENT POINTER
2793                        04,3506   0 3500 1           TC     -6
2794  REF   1               04,3507   0 3554 0           TC     LSTFULL
2795  REF  63 LAST 306      04,3510   3 0001 0  PUTINLST CA     L
2796  REF   4 LAST 306      04,3511   50 134 1           INDEX  LSTPTR
2797  REF   5 LAST 306      04,3512   54 333 0           TS     DSPLIST
2798  REF   4 LAST 289      04,3513   0 5545 0           TC     JOBSLEEP
```

R2799 GRABWAIT IS A SPECIAL ENTRANCE FOR ROUTINES IN FIXED BANKS ONLY. IF
R2800 SYSTEM IS NOT GRABBED, IT GRABS IT AND RETURNS TO L+1 (L = LOC FROM
R2801 WHICH THE TC GRABWAIT WAS DONE). IF SYSTEM IS GRABBED, IT PUTS CALLING
R2802 JOB TO SLEEP WITH L+1 GOING INTO LIST FOR EVENTUAL WAKING UP WHEN
R2803 SYSTEM IS FREED.

```
2804  REF   1                       4644           SETLOC GRABUSY  +2
2805  REF   6 LAST 306        4644  10 330 0  GRABWAIT CCS    GRABLOCK
2806  REF   1                 4645  1 4637 0           TCF    PREGBSY        GRABBED, PUT L+1 INTO LIST, GO TO SLEEP.
2807  REF  78 LAST 306        4646  3 7763 1           CAF    ONE            NOT GRABBED, GRAB AND RETURN TO L+1.
```

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```
2808  REF   7 LAST 306          4647   54 330 0            TS     GRABLOCK
2809  REF 141 LAST 306          4650    0 0002 0            TC     Q


2810  REF   1                   4651    4 4656 1  PRENVBSY  CS     2K+3          SPECIAL ENTRANCE FOR ROUTINES IN FIXED
2811  REF 142 LAST 307          4652    6 0002 0            AD     Q             BANKS ONLY DESIRING THE FCADR OF(LOC
2812  REF   3 LAST 306          4653    6 0004 0            AD     FBANK         FROM WHICH THE TC PRENVBSY WAS DONE) -2
2813  REF  23 LAST 306          4654    0 5225 1  NVSUBUSY  TC     POSTJUMP      TO BE ENTERED.
2814  REF   1                   4655   10001 1              CADR   NVSJBSYB
2815                            4656   02003 0  2K+3       OCT    2003

2816  REF   2 LAST 306                 04,3514              SETLOC PUTINLST +4
2817  REF  54 LAST 306          04,3514   54 001 1  NVSUBSY1  TS     L
2818  REF   8 LAST 289          04,3515   10 303 0            CCS    DSPLOCK       TEST IF REALLY LOCKED OUT
2819                            04,3516    0 3521 1            TC     +3            STILL BUSY
2820  REF  55 LAST 307          04,3517    3 0001 0            CA     L             DSPLOCK = +0 SO RETURN DIRECTLY
2821  REF  11 LAST 306          04,3520    0 5230 0            TC     BANKJUMP
2822  REF  37 LAST 306          04,3521    3 7762 0            CAF    TWO           SET FOR GRABBED STATE AND NVSUBJSY USE
2823  REF   8 LAST 307          04,3522   54 330 0             TS     GRABLOCK
2824  REF  56 LAST 307          04,3523    3 0001 0            CA     L
2825  REF   6 LAST 306          04,3524   56 335 1            XCH    DSPLIST +2    ENTER CADR INTO FIRST POSITION OF LIST
2826  REF   7 LAST 307          04,3525   56 334 0            XCH    DSPLIST +1          (BOTTOM)
2827  REF   8 LAST 307          04,3526   56 333 1            XCH    DSPLIST
2828  REF 181 LAST 295          04,3527   10 000 0            CCS    A
2829  REF   2 LAST 306          04,3530    0 3554 0            TC     LSTFULL
2830                            04,3531    0 3533 1            TC     +2
2831  REF   3 LAST 307          04,3532    0 3554 0            TC     LSTFULL
2832  REF   2 LAST 277          04,3533    0 4601 1            TC     RELDSPON
2833  REF  57 LAST 307          04,3534    3 0001 0            CA     L
2834  REF   5 LAST 306          04,3535    0 5545 0  ENDNVBSY  TC     JOBSLEEP


R2835  NVSBWAIT IS A SPECIAL ENTRANCE FOR ROUTINES IN FIXED BANKS ONLY. IF
R2836  SYSTEM IS NOT BUSY, IT EXECUTES V/N AND RETURNS TO L+1 (L= LOC FROM
R2837  WHICH THE TC NVSBWAIT WAS DONE). IF SYSTEM IS BUSY, IT PUTS CALLING JOB
R2838  TO SLEEP WITH L-1 GOING INTO LIST FOR EVENTUAL WAKING UP WHEN SYSTEM
R2839  IS NOT BUSY.

2840  REF   2 LAST 219                4657              SETLOC NVSJBUSY +3
2841  REF   8 LAST 288          4657   54 113 0  NVSBWAIT  TS     NVTEMP
2842  REF   9 LAST 307          4660   10 303 0            CCS    DSPLOCK
2843  REF   1                   4661    1 4664 0            TCF    NVSBWT1       BUSY
2844  REF 143 LAST 307          4662    3 0002 0            CA     Q             FREE. NVSUB WILL SAVE L+1 FOR RETURN
2845  REF   3 LAST 219          4663    1 4451 1            TCF    NVSJB   +5    AFTER EXECUTION.
2846  REF 144 LAST 307          4664   24 002 0  NVSBWT1   INCR   Q             L+2. PRENVBSY WILL PUT L-1 INTO LIST AND
2847  REF   1                   4665    1 4651 0            TCF    PRENVBSY      GO TO SLEEP.
```

L PINBALL GAME BUTTONS AND LIGHTS USER'S OWN PAGE NO. 77 S3

```
2848   REF 145 LAST 307    4666  56 002 0  RELDSP    XCH   Q          SET DSPLOCK TO +0, TURN RELDSP LIGHT
2849   REF   1            4667  54 134 0            TS    RELRET     OFF,  SEARCH DSPLIST
2850   REF   2 LAST 262   4670  3 7771 1            CAF   NEG1
2851   REF   9 LAST 307   4671  6 0330 1            AD    GRABLOCK
2852                      4672  0 0006 1            EXTEND             SEARCH LIST ONLY IF GRABLOCK = +2
2853   REF   1            4673  6 4701 0            BZMF  RELDSP2      (SOMEONE USED NVSUBUSY)
2854   REF   1            4674  0 4714 1            TC    WKSEARCH
2855   REF   2 LAST 308   4675  0 4701 0            TC    RELDSP2      LIST EMPTY
2856   REF   4 LAST 290   4676  0 5551 0            TC    JOBWAKE      LIST NOT EMPTY
2857   REF  79 LAST 306   4677  3 7763 1            CAF   ONE
2858   REF  10 LAST 308   4700  54 330 0            TS    GRABLOCK
2859                      4701  0 0004 0  RELDSP2   INHINT
2860   REF  12 LAST 303   4702  4 7757 1            CS    BIT5         TURN OFF KEY RELEASE LIGHT
2861                      4703  0 0006 1            EXTEND             (BIT 5 OF CHANNEL 11)
2862   REF  10 LAST 304   4704  03 011 1            WAND  DSALMOUT
2863   REF  91 LAST 291   4705  3 7767 0            CAF   ZERO
2864   REF  10 LAST 307   4706  54 303 0            TS    DSPLOCK
2865                      4707  0 0003 1            RELINT
2866   REF   2 LAST 308   4710  0 0134 1            TC    RELRET
2867   REF 146 LAST 308   4711  56 002 0  RELDSP1   XCH   Q          SET DSPLOCK TO +0, RELDSP LIGHT OFF,
2868   REF   3 LAST 308   4712  54 134 0            TS    RELRET     NO LIST SEARCH
2869   REF   3 LAST 308   4713  0 4701 0            TC    RELDSP2


2870   REF  92 LAST 308   4714  3 7767 0  WKSEARCH  CAF   ZERO       SEARCHES LIST. LEAVES RESULT IN A.
2871   REF   9 LAST 307   4715  56 333 1            XCH   DSPLIST    IF EMPTY, RETURN TO L+1.
2872   REF  10 LAST 308   4716  56 334 0            XCH   DSPLIST +1 IF NOT EMPTY, INHINT AND RETURN TO L+2.
2873   REF  11 LAST 308   4717  56 335 1            XCH   DSPLIST +2
2874                      4720  0 0006 1            EXTEND
2875   REF   3 LAST 170   4721  1 7020 0            BZF   TCQ          EMPTY, RETURN TO L+1
2876                      4722  0 0004 0            INHINT             NOT EMPTY
2877   REF   5 LAST 306   4723  1 7015 0            TCF   Q+1          RETURN TO L+2


2878   REF 147 LAST 308   4724  56 002 0  FREEDSP   XCH   Q
2879   REF   1            4725  54 134 0            TS    FREERET
2880                      4726  0 0004 0            INHINT
2881   REF   1            4727  3 4735 1            CAF   SHOTIME
2882   REF  31 LAST 303   4730  0 5663 1            TC    WAITLIST
2883   REF  54 LAST 290                 E0         EBANK= DSPCOUNT
2884                      4731   03536 1            2CADR FREEWAIT
C2884  REF   1            4732   10060 0
2885                      4733  0 0003 1            RELINT
2886   REF   2 LAST 308   4734  0 0134 1            TC    FREERET

2887                      4735   00257 1  SHOTIME   DEC   175          SET FOR 1.75 SEC.
2888   REF   1                   04,3536           SETLOC ENDNVBSY +1
```

L PINBALL GAME BUTTONS AND LIGHTS USER'S OWN PAGE NO. 78 S3

```
2889  REF   3 LAST 276    04,3536  3 5210 1  FREEWAIT CAF    CHRPRIO      CALLED BY T3RUPT
2890  REF  11 LAST 276    04,3537  0 5505 1           TC     NOVAC
2891  REF  55 LAST 308                   E0           EBANK= DSPCOUNT
2892                      04,3540    03543 0           2CADR  FREDSPDO
C2892 REF   1             04,3541    10060 0
2893  REF  22 LAST 276    04,3542  0 5727 0           TC     TASKOVER


2894  REF   2 LAST 308    04,3543  0 4714 1  FREDSPDO TC     WKSEARCH     CALLED BY EXECUTIVE
2895  REF   1             04,3544  0 3552 0           TC     LSTEMPTY     LIST EMPTY
2896  REF   5 LAST 308    04,3545  0 5551 0           TC     JOBWAKE      LIST NOT EMPTY
2897                      04,3546  0 0003 1           RELINT
2898  REF  80 LAST 308    04,3547  3 7763 1           CAF    ONE          SET FOR GRABBED CONDITION
2899  REF  11 LAST 308    04,3550  54 330 0           TS     GRABLOCK
2900  REF  46 LAST 291    04,3551  0 5567 0           TC     ENDOFJOB
2901  REF  93 LAST 308    04,3552  3 7767 0  LSTEMPTY CAF    ZERO         SET FOR FREE CONDITION
2902                      04,3553  0 3550 1           TC     -3


2903  REF   4 LAST 282    04,3554  0 6000 1  LSTFULL  TC     ABORT
2904                      04,3555    01206 1           OCT    01206        PINBALL WAITING LINE FULL.
```

L PINBALL GAME BUTTONS AND LIGHTS USER'S OWN PAGE NO. 79 S3

```
P2905  VBTSTLTS TURNS ON ALL DISPLAY PANEL LIGHTS. AFTER 5 SEC, IT TURNS
R2906  OFF THE CAUTION AND STATUS LIGHTS.

 2907   REF  1                          05,3414          SETLOC  DSPMMEND +1

 2908                                   05,3414  0 0004 0 V3TSTLTS INHINT
 2909   REF  24 LAST 283                05,3415  4 7763 0         CS      BIT1          SET BIT 1 OF IMODES33 SO IMUMON WONT
 2910   REF  13 LAST 246                05,3416  7 0366 0         MASK    IMODES33      TURN OUT ANY LAMPS.
 2911   REF  25 LAST 310                05,3417  6 7763 1         AD      BIT1
 2912   REF  14 LAST 310                05,3420  54 366 0         TS      IMODES33

 2913   REF  1                          05,3421  3 3457 1         CAF     TSTCON1       TURN ON UPLINK ACTIVITY, TEMP, KEY RLSE,
 2914                                   05,3422  0 0006 1         EXTEND                V/N FLASH, OPERATOR ERROR.
 2915   REF  11 LAST 308                05,3423  05 011 1         NOR     DSALMOUT
 2916   REF  1                          05,3424  3 3460 0         CAF     TSTCON2       TURN ON NO ATT, GIMBAL LOCK, TRACKER,
 2917   REF  34 LAST 285                05,3425  54 326 1         TS      DSPTAB  +11D  PROG ALM.
 2918   REF  28 LAST 246                05,3426  3 7752 0         CAF     BIT10         TURN ON TEST ALARM OUTBIT
 2919                                   05,3427  0 0006 1         EXTEND
 2920   REF  2 LAST 246                 05,3430  05 013 0         NOR     CHAN13
 2921   REF  3 LAST 242                 05,3431  3 4570 1         CAF     TEN
 2922   REF  5 LAST 246                 05,3432  54 107 0 TSTLTS1 TS      ERCNT
 2923   REF  1                          05,3433  4 3455 1         CS      FULLDSP
 2924   REF  6 LAST 310                 05,3434  50 107 1         INDEX   ERCNT
 2925   REF  35 LAST 310                05,3435  54 313 1         TS      DSPTAB
 2926   REF  7 LAST 310                 05,3436  10 107 0         CCS     ERCNT
 2927   REF  1                          05,3437  0 3432 1         TC      TSTLTS1
 2928   REF  1                          05,3440  4 3456 1         CS      FULLDSP1
 2929   REF  36 LAST 310                05,3441  54 314 0         TS      DSPTAB  +1    TURN ON 3 PLUS SIGNS
 2930   REF  37 LAST 310                05,3442  54 317 0         TS      DSPTAB  +4
 2931   REF  38 LAST 310                05,3443  54 321 0         TS      DSPTAB  +6
 2932   REF  2 LAST 91                  05,3444  3 7764 0         CAF     ELEVEN
 2933   REF  7 LAST 281                 05,3445  54 307 1         TS      NOUT
 2934                                   05,3446  0 0003 1         RELINT
 2935   REF  1                          05,3447  3 3462 1         CAF     SHOLTS
 2936                                   05,3450  0 0004 0         INHINT
 2937   REF  32 LAST 308                05,3451  0 5663 1         TC      WAITLIST
 2938   REF  39 LAST 310                         E0               EBANK=  DSPTAB
 2939                                   05,3452  03463 0          2CADR   TSTLTS2
C2939   REF  1                          05,3453  12060 1
 2940   REF  47 LAST 309                05,3454  0 5567 0         TC      ENDOFJOB      DSPLOCK IS LEFT BUSY (FROM KEYBOARD
A2941                                                                      ACTION) UNTIL TSTLTS3 TO INSURE THAT
A2942                                                                      LIGHTS TEST WILL BE SEEN.


 2943                                   05,3455  05675 0 FULLDSP  OCT     05675         DISPLAY ALL 8:S
 2944                                   05,3456  07675 1 FULLDSP1 OCT     07675         DISPLAY ALL 8:S AND +
 2945                                   05,3457  00175 1 TSTCON1  OCT     00175
A2946                                                                      UPLINK ACTIVITY, TEMP, KEY RLSE,
A2947                                                                      V/N FLASH, OPERATOR ERROR.
```

L PINBALL GAME BUTTONS AND LIGHTS USER'S OWN PAGE NO. 80 S3

```
 2948                          05,3460   40650 0  TSTCON2  OCT    40650          DSPTAB+11D  BITS 4,6,8,9.
A2949                                                                           NO ATT, GIMBAL LOCK, TRACKER, PROG ALM.
 2950                          05,3461   00115 1  TSTCON3  OCT    00115          CHAN 11  BITS 1, 3, 4, 7.
A2951                                                                           UPLINK ACTIVITY, TEMP, OPERATOR ERROR.
 2952                          05,3462   00764 1  SHOLTS   OCT    764            5 SEC


 2953  REF   4 LAST 309       05,3463   3 5210 1 TSTLTS2  CAF    CHRPRIO        CALLED BY WAITLIST
 2954  REF  12 LAST 309       05,3464   0 5505 1         TC     NOVAC
 2955  REF  40 LAST 310                    E0           EBANK= DSPTAB
 2956                         05,3465     03470 1       2CADR  TSTLTS3
C2956  REF   1               05,3466     12060 1
 2957  REF  23 LAST 309       05,3467   0 5727 0         TC     TASKOVER


 2958  REF   1                05,3470   4 3461 0 TSTLTS3  CS     TSTCON3        CALLED BY EXECUTIVE
 2959                         05,3471   0 0004 0         INHINT
 2960                         05,3472   0 0006 1         EXTEND                  TURN OFF  UPLINK ACTIVITY, TEMP,
 2961  REF  12 LAST 310       05,3473   03 011 1         MAND   DSALMOUT        OPERATOR ERROR.
 2962  REF  29 LAST 310       05,3474   4 7752 1         CS     BIT10           TURN OFF TEST ALARM OUTBIT
 2963                         05,3475   0 0006 1         EXTEND
 2964  REF   3 LAST 310       05,3476   03 013 0         MAND   CHAN13
 2965  REF  26 LAST 289       05,3477   3 7745 0         CAF    BIT15           TURN OFF AUTO, HOLD, FREE, NO ATT, SPARE
 2966  REF  41 LAST 311       05,3500   54 326 1         TS     DSPTAB  +11D    GIMBAL LOCK, SPARE, TRACKER, PROG ALM
 2967  REF   1                05,3501   4 3521 0         CS     13-11+1         SET BITS TO INDICATE ALL LAMPS OUT. TEST
 2968  REF  15 LAST 310       05,3502   7 0366 0         MASK   IMODES33        LIGHTS COMPLETE.
 2969  REF   4 LAST 246       05,3503   6 5642 1         AD     PRIO16
 2970  REF  16 LAST 311       05,3504   54 366 0         TS     IMODES33


 2971  REF   1                05,3505   4 3523 1         CS     OCT56000
 2972  REF  57 LAST 246       05,3506   7 0365 0         MASK   IMODES30
 2973  REF   2 LAST 131       05,3507   6 5641 1         AD     PRIO15          15000.
 2974  REF  58 LAST 311       05,3510   54 365 0         TS     IMODES30

 2975  REF   1                05,3511   4 3522 0         CS     RFAILS2
 2976  REF  74 LAST 246       05,3512   7 0412 1         MASK   RADMODES
 2977  REF  20 LAST 303       05,3513   6 7755 1         AD     BIT7
 2978  REF  75 LAST 311       05,3514   54 412 1         TS     RADMODES

 2979                         05,3515   0 0003 1         RELINT


 2980  REF   2 LAST  90       05,3516   0 2001 1         TC     DSPMM           REDISPLAY C(MODREG)
 2981  REF  24 LAST 307       05,3517   0 5225 1         TC     POSTJUMP        TURN OFF KEY RLSE LIGHT (AND SEARCH LIST
 2982  REF   2 LAST 253       05,3520    11333 1         CADR   VBTERM          IF APPROPRIATE).
A2983                                                                           TURN OFF V/N FLASH, SET LOADSTAT FOR
A2984                                                                           FOR TERMINATE CONDITION, AND GO TO
A2985                                                                           RECALTST. FINALLY DO TC ENDOFJOB.
```

L PINBALL GAME BUTTONS AND LIGHTS USER'S OWN PAGE NO. 81 S3

```
2986                    05,3521   16001 1  13-11,1  OCT    16001
2987                    05,3522   00330 1  RFAILS2  OCT    330          RADAR CDU AND DATA FAIL FLAGS.
2988                    05,3523   55000 1  OCT55000 OCT    55000
```

L ALARM AND ABORT USER'S OWN PAGE NO. 1 S3

```
R0001  PROGRAM DESCRIPTION                                  DATE= 9 FEB 1967
R0002  PROGRAM WRITTEN BY M.HAMILTON              LOG SECTION-ALARM AND ABORT
R0003  MOD BY- R.MELANSON TO ADD DOCUMENTATION    ASSEMBLY SUNBURST REV 107
R0004
R0005  FUNCTIONAL DESCRIPTION-
R0006    TO ILLUMINATE THE PROGRAM ALARM LAMP AND DISPLAY OCTAL ALARM OR ABORT
R0007    CODES VIA VERB 15 NOUN 50. OCTAL CODES SUPPLIED BY CALLING ROUTINE.
R0008
R0009  CALLING SEQUENCE-
R0010    L   TC    ALARM OR ABORT       (IN TASK OR JOB)
R0011    L+1 OCT   (OCTAL CODE IDENTIFYING CAUSE OF ALARM OR ABORT)
R0012
R0013  NORMAL EXIT MODE-
R0015    TO L+2 OF CALLING SEQUENCE IF ALARM
R0016    (TC  TRAP) TO RESTART IF ABORT
R0017
R0018  ALARM OR ABORT EXIT MODE-  NONE
R0019
R0020  OUTPUT-
R0021    ALARM OR ABORT OCTAL CODE IN ONE OF FAILREG REGISTERS FOR DISPLAY.
R0022
R0023  ERASABLE INITIALIZATION-
R0024    FAILREG THRU FAILREG +2 ZEROED BY FRESH START.
R0025
R0026  DEBRIS-
R0027    Q,A,L,ALMCADR,ALMCADR +1,RUPTREG4
 0054                                  4736          BLOCK  2

 0055                          4736  0 0004 0  CCSHOLE INHINT
 00555  REF 148 LAST 308       4737  3 0002 0          CA     Q
 0056   REF   2 LAST 295       4740  55'363 1          TS     ALMCADR

 0057   REF   1                4741  0 6003 1          TC     ABORT2
 0058                          4742   01103 1          OCT    1103

 0059                          4743  0 0004 0  CURTAINS INHINT          SAVE 2CADR OF USER FOR CURTAINS DISPLAY
 00591  REF 149 LAST 313       4744  3 0002 0          CA     Q
 00592  REF   3 LAST 313       4745  55'363 1          TS     ALMCADR

 00598  REF   1                4746  0 4760 1          TC     ALARM2
 0060                          4747   00310 0          OCT    00310

 00602                         4750  0 0004 0  JETENTRY INHINT
 00604  REF   1                4751  3 4754 0          CAF    CURTBB
 00606  REF  13 LAST 287       4752  56 006 1          XCH    BBANK
 00607  REF   1                4753  1 2007 0          TCF    FORGETIT

 00608  REF  28 LAST 224                 E3           EBANK= LST1
 00609  REF   2 LAST 313       4754   16063 0  CURTBB   BBCON  FORGETIT
 0061                                07,2103           BANK   07
```

L ALARM AND ABORT USER'S OWN PAGE NO. 2 53

```
00612 REF   1              07,2103  0 4632 1  LARMLARM TC    GRABDSP
00614 REF  48 LAST 310     07,2104  1 5567 1           TCF   ENDOFJOB
00615 REF   2 LAST  93     07,2105  1 2107 1           TCF   DOALARM +1

0062  REF  10 LAST 219     07,2106  0 4644 0  DOALARM  TC    GRABWAIT      DISPLAY FAILREG.
0063  REF   1              07,2107  3 2112 1           CAF   FAILDISP
0064  REF  22 LAST 221     07,2110  0 4657 1           TC    NVSBWAIT

0065  REF   7 LAST 221     07,2111  0 5566 1           TC    EJFREE        FREE DISPLAY AND END JOB.

0066                       07,2112   01550 0  FAILDISP DCT   01550         MONITOR DISPLAYS 3 FAILREG REGS

0070  REF  30 LAST 195     07,2113  0 4755 1  JETABORT TC    ALARM
0071                       07,2114   00312 1           DCT   00312

0072  REF   1              07,2115  1 4750 0           TCF   JETENTRY

R0480 ALARM IS CALLED EITHER IN INTERRUPT OR UNDER EXECUTIVE CONTROL

R0481 CALLING SEQUENCE.

A0482                                                 TC    ALARM
A0483                                                 DCT   AAANN         ALARM NO. NN IN GENERAL AREA AAA.

A0484                                                                      (RETURNS HERE)


05002                            4755                 BLOCK 02
0501                       4755  0 0004 0  ALARM     INHINT

05012 REF 150 LAST 313     4756  3 0002 0           CA    Q
05014 REF   4 LAST 313     4757  55'363 1           TS    ALMCADR

0502  REF 151 LAST 314     4760  50 002 0  ALARM2   INDEX Q
0503                       4761  3 0000 1           CA    0
0504  REF  68 LAST 307     4762  54 001 1  BORTENT  TS    L               STORE RETURN -1 IN L

05042 REF  14 LAST 313     4763  3 0006 1           CA    BBANK
05044 REF   5 LAST 314     4764  55'364 0           TS    ALMCADR +1

0505  REF 152 LAST 314     4765  3 0002 0           CA    Q
0506  REF  10 LAST 228     4766  54 073 1           TS    RUPTREG4

0507  REF   8 LAST 296     4767  11'360 1  CHKFAIL1 CCS   FAILREG         IS ANYTHING IN FAILREG
0508  REF   1              4770  1 4773 1           TCF   CHKFAIL2         YES TRY NEXT REG
0509  REF   9 LAST 314     4771  23'360 0           XCH   FAILREG
0510  REF   1              4772  1 5005 0           TCF   PROGLARM         TURN ALARM LIGHT ON FOR FIRST ALARM

0511  REF  10 LAST 314     4773  11'361 0  CHKFAIL2 CCS   FAILREG +1
```

L ALARM AND ABORT USER'S OWN PAGE NO. 3 53

```
 0512   REF   1                  4774  1 4777 0                TCF    FAIL3
 0513   REF  11 LAST 314         4775  23'361 1                LXCH   FAILREG +1
 0514   REF   1                  4776  1 5010 1                TCF    ARMDSPON        LIGHT ALREADY ON

 0515   REF  12 LAST 315         4777  3 1362 1  FAIL3         CA     FAILREG +2
 0516   REF  13 LAST 278         5000  7 7743 1                MASK   POSMAX
 0517   REF 182 LAST 307         5001  10 000 0                CCS    A
 0518   REF   1                  5002  1 5020 1                TCF    MULTFAIL
 0519   REF  13 LAST 315         5003  23'362 1                LXCH   FAILREG +2
 0520   REF   2 LAST 315         5004  1 5010 1                TCF    ARMDSPON        LAST DISPLAY TURN ON UNTIL ERR RESET

 0521   REF  42 LAST 311         5005  4 0326 1  PROGLARM      CS     DSPTAB +11D
 0522   REF   1                  5006  7 6006 0                MASK   OCT40400
 0523   REF  43 LAST 315         5007  26 326 1                ADS    DSPTAB +11D

 05231  REF   2 LAST  93         5010  3 5660 1  ARMDSPON      CAF    PRIO37
 05232  REF  13 LAST 311         5011  0 5505 1                TC     NOVAC
 05233  REF  14 LAST 315                     E2                EBANK= FAILREG
 05234                           5012   02103 1                2CADR  LARMJARM
C05234  REF   1                  5013   16062 1
 0524   REF  11 LAST 314         5014  56 073 0  MULTEXIT      XCH    RUPTREG4
 05245                           5015  0 0003 1                RELINT
 0525   REF 183 LAST 315         5016  50 000 1                INDEX  A
 0526                            5017  0 0001 0                TC     1

 0527   REF  59 LAST 314         5020  3 0001 0  MULTFAIL      CA     L
 0528   REF  27 LAST 311         5021  6 7745 0                AD     BIT15
 0529   REF  15 LAST 315         5022  57'362 1                XCH    FAILREG +2
 05292  REF  14 LAST 315         5023  7 7743 1                MASK   POSMAX
 05294  REF  16 LAST 315         5024  55'361 0                TS     FAILREG +1

 0530   REF   1                  5025  1 5014 0                TCF    MULTEXIT

 0545                                    6000                 BLOCK  03
 0550                            6000  0 0004 0  ABORT         INHINT
 05502  REF 153 LAST 314         6001  3 0002 0                CA     Q
 05504  REF   6 LAST 314         6002  55'363 1                TS     ALMCADR

 0551   REF 154 LAST 315         6003  50 002 0  ABORT2        INDEX  Q
 0552                            6004  3 0000 1                CAF    0
 0553   REF   1                  6005  0 4762 0                TC     BORTENT
 0554                            6006   40400 1  OCT40400      OCT    40400
 05542  REF  19 LAST 273         6007  4 7750 0                CS     BIT12           PUT RESTARTABILITY FLAG DOWN & GENERATE
 05544  REF   8 LAST 229         6010  7 0075 1                MASK   FLAGWRD1        A RESTART TO YIELD A FAKESTRT.
 05546  REF   9 LAST 315         6011  54 075 1                TS     FLAGWRD1
 0555   REF   1                  6012  1 6012 0  WHIMPER      TCF    WHIMPER
```

L UPDATE PROGRAM PART 1 OF 2 USER'S OWN PAGE NO. 1 S3

```
R0001   PROGRAM NAME- UPDATE PROGRAM
R000105 PROGRAM WRITTEN BY- RHODE
R00011  MOD NO.- 2
R00012  MOD BY- KILROY TO ADD AGC CLOCK AND TE(V75E4ETTTTE) UPDATE FEATURE.
R00013  DATE- 01FEB67
R00014  LOG SECTIONS- UPDATE PROGRAM PART 1 OF 2
R00015                UPDATE PROGRAM PART 2 OF 2
R00016  ASSEMBLY- REV 93 OF SUNBURST
R00017  FUNCTIONAL DESCRIPTION- TO PROCESS COMMANDS AND DATA INSERTIONS
R00018          REQUESTED BY THE GROUND VIA UPLINK.
R00019          VERBS V64, V67, V70, V71, V72, V73, V75 AND V76 WILL NOT BE
R0002           PROCESSED IF THE MISSION TIMERS ARE DISABLED(I.E. AN MP IS IN
R00021          PROGRESS). OPERATOR ERROR LIGHT WILL BE TURNED ON.
R00022          V65, V66 AND V74 WILL BE PROCESSED EVEN IF A MP IS IN PROGRESS
R00025  CALLING SEQUENCE- TCF XXUPDAT   WHERE XX = EXTENDED VERBS(64 TO 76)
R00026                                  LST2FAN CONTAINS A LIST OF TCF XXUPDAT
R00027                                  WHICH ARE USED BY VERBFAN IN PINBALL TO
R00028                                  GIVE CONTROL TO THE UPDATE PROGRAM.
R00029  SUBROUTINES CALLED- POSTJUMP,IBNKCALL, BANKCALL, CHECKMM, GRABWAIT,
R0003           NEWMODEX, FREEDSP, WAITLIST, ENDOFJOB, NOVAC, TASKOVER, FINDVAC
R00031          ENDUP, DOV67, DOV70, DOV71, DOV72, DOV73, DOV74, DFITMCAL,
R00032          GRRPLACE, NVSBWAIT, ENDIDLE, XACTALM, MGETUP, UPDATINT, TPAGREE
R00033  NORMAL EXIT MODE- TC    BANKCALL
R00034                   CADR  ENDUP
R00035  ALARM OR ABORT EXIT MODE- BZF   XACTALM    IF MP IN PROGRESS
R00036
R00037                           TC    BANKCALL   IF MP IN PROGRESS
R00038                           CADR  XACTALM
R00039  RESTART PROTECTION- NONE FOR VERBS 64 TO 74. RESTART PROTECTION IS
R0004           INCLUDED FOR V75 AND V76 UNDER THE FOLLOWING CIRCUMSTANCES-----
R00041          1. THE DATA HAS BEEN SENT AND VERIFIED(I.E. V33E HAS BEEN SENT)
R00042          2. PROGRAM IS IN THE PROCESS OF MOVING DATA FROM STRUFF TO
R00043             APPROPRIATE REGISTERS OR
R00044             VERB 76 OR VERB 75(INDEX = 4 ONLY) PROGRAM(S) ARE WAITING(VIA WAITLIST
R00045             3 SEC CALL) FOR ORBITAL INTEGRATION TO BE TURNED OFF.
R00046          ***OF COURSE ALL GROUND UPDATES(IF LOST DUE TO A RESTART) CAN
R00047          BE RESTARTED BY SENDING THE COMMANDS AND DATA A SECOND TIME***
R00051  INPUT(SEE LATEST AS205 GSOP;R527;FOR MORE INFO)-     .....DESCRIPTION OF UPDATE COMPONENTS.....
R00053                                                  COMP.
R00054  UPDATE ENTRY    DESCRIPTION OF UPDATE VERBS      NO.  SYMBOL  VALUES        DEFINITION  (WHERE STORED)
R00056  ---------------  -------------------------------  ---- ------  ------------  ----------------------------
R00058  V64E1EXXXXXE     SET MISSION TIMER I TO ELAPSE AT A  1.    I     1,2,3,4       MISSION TIMERS
R0006         XXXXXE     GIVEN GROUND ELAPSED TIME(GET),X-S  2.  XXXXX                 MSB OF GET(MUST BE IN)
R00062                   ARE THE GET(IN CENTISECONDS OF THE  3.  XXXXX                 LSB OF GET(THE FUTURE)
R00064                   DESIRED EVENT.
R00065  V65E             SET GUIDANCE REFERENCE RELEASE      NONE
R00066                   DISCRETE.
R00067  V66E             INITIATE THE LGC DFI TLM CALIBRATE  NONE
R00068                   ROUTINE.
R00069  V67EXXXE         ENTER A THREE DIGIT OCTAL NUMBER    1.   XXX     1-377(OCTAL)  SEE GSOP FOR LIST OF COMMANDS
```

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R00071		REPRESENTING THE 8 BIT COMMAND TO					
R00072		BE SENT TO THE LMP.					
R00073	V70E1ETTTTTE	INCREMENT TIMER I BY TTTTT OCTAL	1.	I	1,2,3,4		MISSION TIMERS
R00075		SECONDS.	2.	TTTTT			**SEE NOTES TO LEFT**
R00077		**SEE BELOW FOR DESCRIPTION OF					
R00079		:UPDATE OF TIMER1 LOGIC : AND					
R00081		:TIMER1 MAINTENANCE LOGIC:**					
R00085	V71E1EPPE	SET MISSION PHASE REGISTER I TO	1.	I	1,2,3,4		MISSION PHASE REGISTERS
R00087		MISSION PHASE PP (OCTAL)	2.	PP	7,10,11,13,15(OCT)		MISSION PHASES
R00089	V72E1EPPETTTTTE	(--COMBINATION OF V70 AND V71.--)					
R0009	V73E1E	CHANGE THE STATE OF THE DPS COLD	1.	I	1		ENABLE/INHIBIT RCS TESTING
R00092		SOAK (MISSION PHASE 8) DISCRETE(I=2)		I	2		ENABLE/INHIBIT DPS COLD SOAK
R00094				I	3		ENABLE/INHIBIT RCS COLD SOAK
R00096							(I = 1 OR 3 WILL ONLY INVERT
R00098							RESPECTIVE BITS OF FLAGWRD2 AND
R0010							HAVE NO OTHER EFFECT ON 206)
R00102	V74E	MISSION IDLE COMMAND.	NONE				
R00104		(VER3 15,NOUN 50, R1 = FAILREG,					
R00105		R2 = FAILREG +1, R3 = FAILREG +2					
R00106		WILL APPEAR ON DSKY)					
R00107	V75E1EXXXXXE	UPDATE TARGET PARAMETERS FOR DPS1	1.	I	1		DPS1 TARGET PARAMS UPDATE CODE
R00109	XXXXXE	BURN.(MISSION PHASE 9).	2.	XXXXX			MSB OF R(P) (RP)
R00111			3.	XXXXX			LSB OF R(P) (RP +1)
R001121							(RP IS THE DESIRED PERIGEE OR APOGEE
R001123							RADIUS SCALED AT METERS 2(24))
R00113	V75E2EXXXXXE	UPDATE TARGET PARAMETERS FOR DPS2	1.	I	2		DPS2 TARGET PARAMS UPDATE CODE
R00115	XXXXXE	BURN (MISSION PHASE 11).	2.	XXXXX			MSB OF CPT(6) (CPT6/2)
R00117	XXXXXE		3.	XXXXX			LSB OF CPT(6) (CPT6/2 +1)
R00119	XXXXXE		4.	XXXXX			MSB OF CPT(7) (CPT6/2 +2)
R00121	XXXXXE		5.	XXXXX			LSB OF CPT(7) (CPT6/2 +3)
R00123	XXXXXE		6.	XXXXX			MSB OF CPT(8) (CPT6/2 +4)
R00125			7.	XXXXX			LSB OF CPT(8) (CPT6/2 +5)
R00127							(CPT/6 IS 1/2 UNIT NORMAL TO THE
R00129							DESIRED ORBITAL PLANE IN STABLE MEMBER
R001301							COORDINATES)
R00131	V75E3EXXXXXE	UPDATE TARGET PARAMETERS FOR APS2	1.	I	3		APS2 TARGET PARAMS UPDATE CODE
R00133	XXXXXE	BURN (MISSION PHASE 13).	2.	XXXXX			MSB OF RCSM(TA)0 (RIVEC)
R00135	XXXXXE		3.	XXXXX			LSB OF RCSM(TA)0 (RIVEC +1)
R00137	XXXXXE		4.	XXXXX			MSB OF RCSM(TA)1 (RIVEC +2)
R00139	XXXXXE		5.	XXXXX			LSB OF RCSM(TA)1 (RIVEC +3)
R00141	XXXXXE		6.	XXXXX			MSB OF RCSM(TA)2 (RIVEC +4)
R00143	XXXXXE		7.	XXXXX			LSB OF RCSM(TA)2 (RIVEC +5)
R00145	XXXXXE		8.	XXXXX			MSB OF TA (TINT)
R00147	XXXXXE		9.	XXXXX			LSB OF TA (TINT +1)
R00149	XXXXXE		10.	XXXXX			MSB OF RD (RCV)
R00151			11.	XXXXX			LSB OF RD (RCV +1)
R00153							(RIVEC IS THE POSITION VECTOR OF THE
R001532							DESIRED INTERCEPT POINT IN STABLE
R00154							MEMBER COORD SCALED AT METERS 2(25).
R001542							TINT IS THE TIME SCALED AT CSEC 2(28).

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L       UPDATE PROGRAM PART 1 OF 2                                      USER'S OWN PAGE NO.  3          53

R00155                                                                  RCO IS THE DESIRED RADIUS AT CUTOFF
R00156                                                                   SCALED AT METERS 2(25))
R00157  V75E4E TTTTTE   UPDATE LGC CLOCK(TIME2,TIME1)          1.   I      4        LGC AND SV CLOCK UPDATE CODE
R00159                  AND STATE VECTOR TIME(TE,TE +1)        2.  TTTTT           DELTA TIME(SP,OCTAL,CSEC) TO
R00161                  WITH TTTTT(IN CENTISECONDS)                                BE ADDED TO TIME1 AND TE +1
R00163  V76E  XXXXXE    STATE VECTOR UPDATE.                   1.  XXXXX           MSB OF X POSITION (REFRRECT    )
R00165        XXXXXE                                           2.  XXXXX           LSB OF X POSITION (REFRRECT +1)
R00167        XXXXXE                                           3.  XXXXX           MSB OF Y POSITION (REFRRECT +2)
R00169        XXXXXE                                           4.  XXXXX           LSB OF Y POSITION (REFRRECT +3)
R00171        XXXXXE                                           5.  XXXXX           MSB OF Z POSITION (REFRRECT +4)
R00173        XXXXXE                                           6.  XXXXX           LSB OF Z POSITION (REFRRECT +5)
R00175        XXXXXE                                           7.  XXXXX           MSB OF X VELOCITY (REFVRECT    )
R00177        XXXXXE                                           8.  XXXXX           LSB OF X VELOCITY (REFVRECT +1)
R00179        XXXXXE                                           9.  XXXXX           MSB OF Y VELOCITY (REFVRECT +2)
R00181        XXXXXE                                          10.  XXXXX           LSB OF Y VELOCITY (REFVRECT +3)
R00183        XXXXXE                                          11.  XXXXX           MSB OF Z VELOCITY (REFVRECT +4)
R00185        XXXXXE                                          12.  XXXXX           LSB OF Z VELOCITY (REFVRECT +5)
R00187        XXXXXE                                          13.  XXXXX           MSB OF TIME       (TE       )
R00189        XXXXXE                                          14.  XXXXX           LSB OF TIME       (TE +1    )
R00191                                                                  (POSITION SCALED AT KILOMETERS 2(14).
R00193                                                                  VELOCITY SCALED AT METERS/CSEC
R00195                                                                   2(7) / 1.29753638
R00196                                                                  TIME SCALED AT CENTISECONDS 2(28) )
R00197  UPDATE OF TIMER1 LOGIC(UPDT = TTTTT TIME SENT VIA UPLINK).
R00198                                                          T
R00199  BEFORE    A        A                    A             H
R0020   UPDATE    N        N                    N             E
R00201  TIMER1 = D UPDT = D TIMER1 + UPDT = D TIMER1 + UPDT = N TIMER1 =
R00202  --------- - ----- - ---------------- - ---------------- - -------------
R00203            (        (
R00204            (        ( OVERFLOW                          NO CHANGE (EXCEPT OPERATOR ERROR = ON)
R00205            (        (
R00206            (        (
R00207            (        (                  (
R00208            ( .GT. +0(                  (  .GE. +0          TIMER1 + UPDT
R00209            ( .LT. -0(   NO             (
R0021             (        ( OVERFLOW         (  .LT. -0            0
R00211  .GE. +0   (        (                  (
R00212            (        (                  (  .EQ. -0            0
R00213            (        (                  (
R00214            (        (
R00215            (
R00216            (        (
R00217            ( .EQ. +0(                                      JPDT
R00218            ( .EQ. -0(
R00219            (        (
R0022             (
R00221
R00222  .LE. -0                                                     JPDT
```

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```
R00223  TIMER MAINTENANCE LOGIC(BY MMAINT)-
R00224  TIMER1 =  MEANS
R00225  -------  ------------------------------------------------------------
R00226   .GT. +0  TIMER1 IS COUNTING DOWN
R00227   .EQ. +0  MISSION PHASE IN ASSOCIATED MISSION PHASE REGISTER IS NOW DUE
R00228   .LT. -0  FREE BUT LOADED BY GROUND
R00229   .EQ. -0  FREE
R00321  OUTPUT- PERFORM UPDATES AS DESCRIBED IN GSOP AND :INPUT:
R003215 ERASABLE INITIALIZATION REQUIRED- NONE
R00322  DEBRIS(ERASABLE LOCATIONS DESTROYED BY THIS PROGRAM)- MPAC - MPAC +2,
R003225          STCOUNT, EBANK, UPVERB, UPOLDMOD, FLAGWRD2(BIT6),UPTEMP,
R00323           UPTEMP1, COMPNUMB, REFRRECT - REFRRECT +5, REFRCV - REFRCV +5,
R003235          REFVRECT - REFVRECT +5, REFVCV - REFVCV +5, TE - TE +1,
R00324           DELTAV - DELTAV +5, NUV - NUV +5, REFTC - REFTC +1,
R003245          REFKEP - REFKEP +1, UPINDEX, UPDT
R00325           AND CENTRAL REGISTERS

00329                                    11,3242                BANK   11
003291 REF   3 LAST  70                      E4                 EBANK= STBJEF
0033   REF  25 LAST 311      11,3242  0 5225 1  65UPDAT  TC     POSTJUMP
0034   REF   1              11,3243   56000 1            CADR   GRPLACE
0035   REF  26 LAST 319      11,3244  0 5225 1  74UPDAT  TC     POSTJUMP
0036   REF   1              11,3245   16003 0            CADR   DOV74
0037                        11,3246  0 0004 0  65UPDAT  INHINT
00375  REF  15 LAST 147      11,3247  0 5270 1            TC     IBNKCALL
0038   REF   1              11,3250   56204 1            CADR   DFITMCAL
0039   REF  49 LAST 314      11,3251  1 5567 1            TCF    ENDOFJOB

0040   REF   1              11,3252  3 3311 1  73UPDAT  CA     OCT73
0041   REF   2 LAST 200      11,3253  0 3255 0            TC     67JPDAT +1
0042   REF   1              11,3254  3 3312 1  67UPDAT  CA     OCT67
0043   REF 181 LAST 304      11,3255  54 144 1            TS     MPAC
0044   REF  81 LAST 309      11,3256  3 7763 1            CA     ONE
0045   REF   2 LAST 200      11,3257  0 3277 0            TC     76JPDAT +3
0046   REF   1              11,3260  3 3313 0  70UPDAT  CA     OCT70
0047   REF   2 LAST 200      11,3261  0 3263 0            TC     71JPDAT +1
0048   REF   1              11,3262  3 3314 1  71UPDAT  CA     OCT71
0049   REF 182 LAST 319      11,3263  54 144 1            TS     MPAC
0050   REF  38 LAST 307      11,3264  3 7762 0            CA     TWO
0051   REF   3 LAST 319      11,3265  0 3277 0            TC     76JPDAT +3
0052   REF   1              11,3266  3 3315 0  64UPDAT  CA     11OCT64
0053   REF   2 LAST 200      11,3267  0 3271 0            TC     72JPDAT +1
0054   REF   1              11,3270  3 3316 0  72UPDAT  CA     OCT72
0055   REF 183 LAST 319      11,3271  54 144 1            TS     MPAC
0056   REF  13 LAST 279      11,3272  3 6311 1            CA     THREF
0057   REF   4 LAST 319      11,3273  0 3277 0            TC     76JPDAT +3
0058   REF   1              11,3274  3 3317 1  76UPDAT  CA     OCT76
0059   REF 184 LAST 319      11,3275  54 144 1            TS     MPAC
0060   REF   1              11,3276  3 3320 0            CA     11OCT16
0061   REF 185 LAST 319      11,3277  54 145 0            TS     MPAC +1
```

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```
0062  REF   2 LAST 200   11,3300  0 3303 1          TC    75JPDAT +2
0063  REF   1            11,3301  3 3321 1  75UPDAT  CA    11OCT75
0064  REF 186 LAST 319   11,3302  54 144 1          TS    MPAC
0065  REF   1            11,3303  3 0076 0          CA    FLAGWRD2      TEST IF TIMERS ENABLED
0066  REF  13 LAST 308   11,3304  7 7757 1          MASK  BIT5
0067                     11,3305  0 0006 1          EXTEND
0068  REF   3 LAST 210   11,3306  1 2053 1          BZF   XACTALM       NO. RETURN
0070  REF  23 LAST 283   11,3307  0 5206 0          TC    BANKCALL
0071  REF   1            11,3310   54000 0          CADR  UPPART2
0072                     11,3311  00073 0  OCT73    OCT   00073
0073                     11,3312  00067 0  OCT67    OCT   00067
0074                     11,3313  00070 0  OCT70    OCT   00070
0075                     11,3314  00071 1  OCT71    OCT   00071
0076                     11,3315  00064 0  110CT64  OCT   00064
0077                     11,3316  00072 1  OCT72    OCT   00072
0078                     11,3317  00076 0  OCT76    OCT   00076
0079                     11,3320  00016 0  110CT16  OCT   16
0080                     11,3321  00075 0  110CT75  OCT   00075
```

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```
0001                                  26,2000                 BANK    26
0002   REF    4 LAST 319                     E4                =BANK=  STBUFF
0003   REF    1                 26,2000  3 2515 1  UPPART2   CA      UPE4
0004   REF   15 LAST 302       26,2001  54 003 0             TS      EBANK
0005   REF    1                 26,2002  0 4133 1           TC      CHECKMM
0006                            26,2003   00027 1           OCT     27
0007                            26,2004  0 2006 0           TC       +2
0008   REF    1                 26,2005  0 2513 1           TC      21XCTALM
0009   REF   32 LAST 319       26,2006  3 7763 1           CA      ONE
0010   REF    1                 26,2007  55,715 1           TS      STCOUNT
00105  REF   11 LAST 314       26,2010  0 4644 0           TC      GRABWAIT
00106  REF  187 LAST 320       26,2011  3 0144 0           CA      MPAC
00107  REF    1                 26,2012  55,721 0           TS      UPVERB
0011   REF    9 LAST 290       26,2013  3 0302 0           CA      MODREG
0012   REF    1                 26,2014  55,716 1           TS      UPOLDMOD
00125  REF    5 LAST 215       26,2015  0 4161 0           TC      PHASCHNG
00126                           26,2016   00076 0           OCT     00076           6.7 SPOT TO RESTORE OLD PROGRAM MODE.

0013   REF    4 LAST 221       26,2017  0 4117 1           TC      NEWMODEX
0014                            26,2020   00027 1           OCT     27
0015   REF    2 LAST 321       26,2021  4 1721 0           CS      UPVERB
0016   REF    1                 26,2022  6 2362 1           AD      21OCT75
0017                            26,2023  0 0006 1           EXTEND
0018                            26,2024  1 2030 1           BZF      +4
00183  REF  188 LAST 321       26,2025  3 0145 1           CA      MPAC +1
00186  REF    1                 26,2026  55,722 0           TS      COMPNUMB
0019   REF    1                 26,2027  0 2052 1           TC      UPIN +1
0020   REF   93 LAST 321       26,2030  3 7763 1  UPNO33   CA      ONE             CONTINUE V75
0021   REF    1                 26,2031  6 2523 1           AD      ASTBFM1
0022   REF  189 LAST 321       26,2032  54 146 0           TS      MPAC +2
0023   REF    1                 26,2033  3 2364 1           CA      STATENV         UPDATE PROGRAM IS READY TO ACCEPT TARGET
0024   REF   23 LAST 314       26,2034  0 4657 1           TC      NVSBWAIT        UPDATE INDEX, FLASH V 21 N 01
00241  REF   18 LAST 290       26,2035  0 4475 0           TC      ENDIDLE         WAIT FOR V33, V34 OR DATA.
00242  REF    1                 26,2036  1 2463 0           TCF     UPVERB34        V34 TERMINATE UPDATE PROGRAM.
0025   REF    1                 26,2037  0 2030 0           TC      UPNO33          V33, IGNORE
0026   REF    7 LAST 279       26,2040  3 7761 0           CA      FOUR            OCTAL NO. IN STBUFF
0027   REF    1                 26,2041  55,717 0           TS      UPTEMP
0028   REF    5 LAST 321       26,2042  3 1677 0           CA      STBUFF
0029   REF    1                 26,2043  0 2473 0           TC      UPRANGE         IS STBUFF GE 1 AND LE 4
0030   REF    2 LAST 321       26,2044  0 2030 0           TC      UPNO33           NO, TRY AGAIN
0031   REF    6 LAST 321       26,2045  51,677 0           INDEX   STBUFF           YES
0032   REF    1                 26,2046  3 2515 1           CA      ADFC -1
0033   REF    2 LAST 321       26,2047  55,722 0           TS      COMPNUMB
0034   REF   39 LAST 319       26,2050  3 7762 0           CA      TWO
0035   REF    2 LAST 321       26,2051  55,715 1  UPIN     TS      STCOUNT
0036   REF    2 LAST 321       26,2052  3 2523 1           CA      ASTBFM1
0037   REF    3 LAST 321       26,2053  6 1715 0           AD      STCOUNT
0038   REF  190 LAST 321       26,2054  54 146 0           TS      MPAC +2
0039   REF    2 LAST 321       26,2055  3 2364 1           CA      STATENV         UPDATE PROGRAM IS READY TO ACCEPT THE
0040   REF   24 LAST 321       26,2056  0 4657 1           TC      NVSBWAIT        NEXT COMPONENT, FLASH V21 N01
```

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```
00401  REF  19 LAST 321   26,2057  0 4475 0          TC     ENDIDLE         WAIT FOR V33, V34 OR DATA.
00402  REF   2 LAST 321   26,2060  1 2463 0          TCF    JPVERB34        V34 TERMINATE UPDATE PROGRAM.
0041   REF   2 LAST 321   26,2061  0 2052 1          TC     JPIN +1         V33 , IGNORE
0042   REF   4 LAST 321   26,2062  4 1715 1          CS     STCOUNT         OCTAL NO.
0043   REF   3 LAST 321   26,2063  6 1722 1          AD     COMPNUMB
0044                      26,2064  0 0006 1          EXTEND
0045                      26,2065  1 2070 0          BZF    +3
0046   REF   5 LAST 322   26,2066  25'715 0          INCR   STCOUNT
0047   REF   3 LAST 322   26,2067  0 2052 1          TC     JPIN +1
0048   REF   1            26,2070  3 2522 0  JPHERE  CA     JPADFTP1
0049   REF 191 LAST 321   26,2071  54 146 0          TS     MPAC +2
0050   REF   1            26,2072  3 2353 0          CA     OCTID           INDICATE TO GROUND THAT ALL COMPONENTS
0051   REF  25 LAST 321   26,2073  0 4657 1          TC     NVSBWAIT        HAVE BEEN RECEIVED BY FLASHING V21 N02.
00511  REF  20 LAST 322   26,2074  0 4475 0          TC     ENDIDLE         WAIT FOR V33, V34 OR DATA(COMPONENT NO.)
00512  REF   3 LAST 322   26,2075  1 2463 0          TCF    JPVERB34        V34 TERMINATE UPDATE PROGRAM.
0052   REF   1            26,2076  0 2107 0          TC     JPSTORE         V33, VERIFY
0053   REF   4 LAST 322   26,2077  3 1722 1          CA     COMPNUMB        OCTAL IDENTIFIER
0054   REF   2 LAST 321   26,2100  55'717 0          TS     JPTEMP
0055   REF   1            26,2101  3 1720 0          CA     JPTEMP1
0056   REF   2 LAST 321   26,2102  0 2473 0          TC     JPRANGE
0057   REF   1            26,2103  0 2070 1          TC     JPHERE          BAD OCTAL IDENTIFIER
0058   REF   2 LAST 322   26,2104  3 1720 0          CA     JPTEMP1
0059   REF   3 LAST 321   26,2105  6 2523 1          AD     AST3FM1
0060   REF   4 LAST 322   26,2106  0 2054 1          TC     JPIN +3
0061   REF   7 LAST 221   26,2107  0 4724 1  JPSTORE  TC     FREESP
0062                      26,2110  0 0004 0          INHINT
0063   REF   2 LAST 320   26,2111  4 0076 1          CS     FLAGWRD2        INVERT VERIFLAG FOR GROUND VERIFY
0064   REF  21 LAST 304   26,2112  7 7756 0          MASK   BIT6
0065   REF 155 LAST 315   26,2113  54 002 1          TS     Q
0066   REF  22 LAST 322   26,2114  4 7756 0          CS     BIT6
0067   REF   3 LAST 322   26,2115  7 0076 1          MASK   FLAGWRD2
0068   REF 156 LAST 322   26,2116  6 0002 0          AD     Q
0069   REF   4 LAST 322   26,2117  54 076 1          TS     FLAGWRD2
00691                     26,2120  0 0003 1          RELINT
006911 REF   3 LAST 321   26,2121  4 1721 0          CS     JPVERB          IF A VERB 75 OR 76 UPDATE
006912 REF   2 LAST 321   26,2122  6 2362 1          AD     21OCT75         STAY IN P27 UNTIL UPDATE IS COMPLETED.
006913                    26,2123  0 0006 1          EXTEND                 (THIS IS DONE SO THAT NO OTHER JPDATES
006914 REF   1            26,2124  6 2132 0          BZMF   JPRETURN        WILL BE ALLOWED IF ORBIT INT IS ON)
00692  REF   2 LAST 321   26,2125  0 4133 1          TC     CHECKMM
00694                     26,2126   00027 1          OCT    27
00696  REF   2 LAST 322   26,2127  0 2132 0          TC     JPRETURN
0070   REF   2 LAST 321   26,2130  3 1716 0          CA     JPOLDMOD        RESTORE PRE-P27 MODE
0071   REF   5 LAST 321   26,2131  0 4122 1          TC     NEWMODEX +3     (THIS WILL CAUSE A RELINT)
0072                      26,2132  0 0004 0  JPRETURN INHINT
00721  REF  14 LAST 320   26,2133  3 7757 0          CA     BIT5
0073   REF   5 LAST 322   26,2134  7 0076 1          MASK   FLAGWRD2
0074                      26,2135  0 0006 1          EXTEND
0075   REF   1            26,2136  1 2504 0          BZF    XCTALMRM
0076   REF   1            26,2137  4 2153 0          CS     21OCT64           BEGIN STORING DATA FROM STBUFF
0077   REF   4 LAST 322   26,2140  6 1721 1          AD     JPVERB          YES, CONTINUE
```

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```
0078   REF 134 LAST 315    26,2141  50 000 1          INDEX  A
0079                       26,2142  0 2143 0          TC     +1
0080                       26,2143  0 0006 1          EXTEND
0081   REF   7 LAST 321    26,2144  3 1701 0          DCA    STBJFF +1
0082   REF   1             26,2145  0 2301 1          TC     JPEND64
0083   REF   1             26,2146  0 2311 0          TC     JPEND67          V67
0084   REF   1             26,2147  0 2315 1          TC     JPEND70          V70
0085   REF   1             26,2150  0 2323 1          TC     JPEND71          V71
0086   REF   1             26,2151  0 2331 1          TC     JPEND72          V72
0087   REF   1             26,2152  0 2341 0          TC     JPEND73
0088                       26,2153   00064 0  21OCT64  OCT    00064
0089   REF   1             26,2154  0 2345 1          TC     JPEND75          V75
0090   REF   6 LAST 322    26,2155  4 0076 1  JPEND76 CS     FLAGWRD2         IS ORBITAL INTEGRATION ON
0091   REF  21 LAST 311    26,2156  7 7755 0          MASK   BIT7
0092                       26,2157  0 0006 1          EXTEND
0093   REF   1             26,2160  1 2262 1          BZF    SETJPRCK         YES, SET UP 3SEC CALL TO CHECK AGAIN
00931  REF   6 LAST 321    26,2161  0 4161 0          TC     PHASCHNG
00932                      26,2162   05026 0          OCT    05026
00933                      26,2163   33000 1          OCT    33000
00934                      26,2164  0 0004 0          INHINT                  INHINT BECAUSE PHASCHNG RELINTS AND BECA
C00935                                                                       USE RESTARTED JOB WILL NEED IT.
0094                       26,2165  0 0006 1          EXTEND                  V76
0095   REF   8 LAST 323    26,2166  3 1700 1          DCA    STBJFF           NO, BEGIN LOAD OF UPDATE PARAMETERS
0096   REF   1             26,2167  53'211 0          DXCH   REFRRECT
0097                       26,2170  0 0006 1          EXTEND
0098   REF   9 LAST 323    26,2171  3 1700 1          DCA    STBJFF
0099   REF   1             26,2172  53'241 0          DXCH   REFRCV
0100                       26,2173  0 0006 1          EXTEND
0101   REF  10 LAST 323    26,2174  3 1702 0          DCA    STBJFF +2
0102   REF   2 LAST 323    26,2175  53'213 1          DXCH   REFRRECT +2
0103                       26,2176  0 0006 1          EXTEND
0104   REF  11 LAST 323    26,2177  3 1702 0          DCA    STBJFF +2
0105   REF   2 LAST 323    26,2200  53'243 1          DXCH   REFRCV +2
0106                       26,2201  0 0006 1          EXTEND
0107   REF  12 LAST 323    26,2202  3 1704 0          DCA    STBJFF +4
0108   REF   3 LAST 323    26,2203  53'215 1          DXCH   REFRRECT +4
0109                       26,2204  0 0006 1          EXTEND
0110   REF  13 LAST 323    26,2205  3 1704 0          DCA    STBJFF +4
0111   REF   3 LAST 323    26,2206  53'245 1          DXCH   REFRCV +4
0112                       26,2207  0 0006 1          EXTEND
0113   REF  14 LAST 323    26,2210  3 1706 1          DCA    STBJFF +6
0114   REF   1             26,2211  53'217 0          DXCH   REFVRECT
0115                       26,2212  0 0006 1          EXTEND
0116   REF  15 LAST 323    26,2213  3 1706 1          DCA    STBJFF +6
0117   REF   1             26,2214  53'247 0          DXCH   REFVCV
0118                       26,2215  0 0006 1          EXTEND
0119   REF  16 LAST 323    26,2216  3 1710 0          DCA    STBJFF +8D
0120   REF   2 LAST 323    26,2217  53'221 0          DXCH   REFVRECT +2
0121                       26,2220  0 0006 1          EXTEND
0122   REF  17 LAST 323    26,2221  3 1710 0          DCA    STBJFF +8D
```

L UPDATE PROGRAM PART 2 OF 2 USER'S OWN PAGE NO. 4 S3 E4

```
 0123   REF   2 LAST 323     26,2222   53,251 1          DXCH   REFVCV +2
 0124                       26,2223   0 0006 1          EXTEND
 0125   REF  18 LAST 323     26,2224   3 1712 1          DCA    STBJFF +10D
 0126   REF   3 LAST 323     26,2225   53,223 1          DXCH   REFVRECT +4
 0127                       26,2226   0 0006 1          EXTEND
 0128   REF  19 LAST 324     26,2227   3 1712 1          DCA    STBJFF +10D
 0129   REF   3 LAST 324     26,2230   53,253 0          DXCH   REFVCV +4
 0130                       26,2231   0 0006 1          EXTEND
 0131   REF  20 LAST 324     26,2232   3 1714 1          DCA    STBJFF +12D
 0132   REF   1              26,2233   53,257 1          DXCH   TE
 0133   REF  94 LAST 309     26,2234   3 7767 0          CA     ZERO
 0134   REF   1              26,2235   55,224 0          TS     DELTAV
 0135   REF   2 LAST 324     26,2236   55,225 1          TS     DELTAV +1
 0136   REF   3 LAST 324     26,2237   55,226 1          TS     DELTAV +2
 0137   REF   4 LAST 324     26,2240   55,227 0          TS     DELTAV +3
 0138   REF   5 LAST 324     26,2241   55,230 0          TS     DELTAV +4
 0139   REF   6 LAST 324     26,2242   55,231 1          TS     DELTAV +5
 0140   REF   1              26,2243   55,232 1          TS     NUV
 0141   REF   2 LAST 324     26,2244   55,233 0          TS     NUV +1
 0142   REF   3 LAST 324     26,2245   55,234 1          TS     NUV +2
 0143   REF   4 LAST 324     26,2246   55,235 0          TS     NUV +3
 0144   REF   5 LAST 324     26,2247   55,236 0          TS     NUV +4
 0145   REF   6 LAST 324     26,2250   55,237 1          TS     NUV +5
 0146   REF   1              26,2251   55,254 1          TS     REFTC
 0147   REF   2 LAST 324     26,2252   55,255 0          TS     REFTC +1
 0148   REF   1              26,2253   55,260 0          TS     REFXKEP
 0149   REF   2 LAST 324     26,2254   55,261 1          TS     REFXKEP +1
 01491  REF   4 LAST 222     26,2255   3 7746 0          CAF    PRIO20          SET UP JOB TO STORE NEW STATE FOR DWNTEL
 01492  REF   8 LAST 303     26,2256   0 5516 0          TC     FINDVAC
 01493  REF  36 LAST 300                    E4           EBANK= TDEC
 01494                      26,2257    02475 0          2CADR  JPDATINT
C01494  REF   1              26,2260    16064 1
 0150   REF   4 LAST 322     26,2261   1 2464 1          TCF    JPVERB34 +1     RESTORE PRE-P27 MODE AND EXIT JPDATE
 0151   REF   1              26,2262   3 2524 0 SETUPRCK CA     3SEC21
 0152   REF  33 LAST 310     26,2263   0 5663 1          TC     WAITLIST
 0153   REF  21 LAST 324                    E4           EBANK= STBJFF
 0154                      26,2264    02274 1          2CADR  JPDOAGN
C0154   REF   1              26,2265    54064 1
 01541  REF   7 LAST 323     26,2266   0 4161 0          TC     PHASCHNG
 01542                      26,2267    47016 0          OCT    47016
 01543                      26,2270    00454 1          DEC    300
 01544  REF  22 LAST 324                    E4           EBANK= STBJFF
 01545                      26,2271    02274 1          2CADR  JPDOAGN
C01545  REF   2 LAST 324     26,2272    54064 1
 0155   REF  50 LAST 319     26,2273   0 5567 0          TC     ENDOFJOB
 0156   REF   2 LAST 219     26,2274   3 5651 0 JPDOAGN  CA     PRIO27
 0157   REF  14 LAST 315     26,2275   0 5505 1          TC     NOVAC
 0158   REF  23 LAST 324                    E4           EBANK= STBJFF
 0159                      26,2276    02132 0          2CADR  JPRETURN
C0159   REF   3 LAST 322     26,2277    54064 1
```

L UPDATE PROGRAM PART 2 OF 2 USER'S OWN PAGE NO. 5 S3 E4

```
 0160   REF  24 LAST 311     26,2300  0 5727 0            TC     TASKOVER
 0163   REF   1             26,2301  53'206 0  JPEND64   DXCH   JPGET
01631   REF  24 LAST 324     26,2302  3 1677 0            CA     STBJFF
01634   REF   1             26,2303  55'204 1            TS     JPINDEX
01638   REF   3 LAST 324     26,2304  3 5651 0            CA     PRIO27
 0164   REF   9 LAST 324     26,2305  0 5516 0            TC     FINDVAC
 0165   REF  25 LAST 325                    E4            EBANK= STBJFF
 0166                        26,2306   02325 1            2CADR  WGETUP
C0166   REF   1             26,2307   62064 1
 0167   REF   1             26,2310  0 2471 1            TC     JPQUIT
 0168   REF  26 LAST 325     26,2311  3 1677 0  JPEND67   CA     STBJFF
 0169   REF   2 LAST 325     26,2312  55'204 1            TS     JPINDEX
 0170   REF  27 LAST 319     26,2313  0 5225 1            TC     POSTJUMP
 0171   REF   1             26,2314   62202 0            CADR   DOV67
 0172   REF  27 LAST 325     26,2315  3 1677 0  JPEND70   CA     STBJFF
 0173   REF   3 LAST 325     26,2316  55'204 1            TS     JPINDEX
 0174   REF  28 LAST 325     26,2317  3 1700 1            CA     STBJFF +1
 0175   REF   1             26,2320  55'203 0            TS     JPDT
 0176   REF  28 LAST 325     26,2321  0 5225 1            TC     POSTJUMP
 0177   REF   1             26,2322   62153 1            CADR   DOV70
 0178   REF  29 LAST 325     26,2323  3 1677 0  JPEND71   CA     STBJFF
 0179   REF   4 LAST 325     26,2324  55'204 1            TS     JPINDEX
 0180   REF  30 LAST 325     26,2325  3 1700 1            CA     STBJFF +1
 0181   REF   1             26,2326  55'202 1            TS     JPPHASE
 0182   REF  29 LAST 325     26,2327  0 5225 1            TC     POSTJUMP
 0183   REF   1             26,2330   62155 1            CADR   DOV71
 0184   REF  31 LAST 325     26,2331  3 1677 0  JPEND72   CA     STBJFF
 0185   REF   5 LAST 325     26,2332  55'204 1            TS     JPINDEX
 0186   REF  32 LAST 325     26,2333  3 1700 1            CA     STBJFF +1
 0187   REF   2 LAST 325     26,2334  55'202 1            TS     JPPHASE
 0188   REF  33 LAST 325     26,2335  3 1701 0            CA     STBJFF +2
 0189   REF   2 LAST 325     26,2336  55'203 0            TS     JPDT
 0190   REF  30 LAST 325     26,2337  0 5225 1            TC     POSTJUMP
 0191   REF   1             26,2340   62157 0            CADR   DOV72
 0192   REF  34 LAST 325     26,2341  3 1677 0  JPEND73   CA     STBJFF
 0193   REF   6 LAST 325     26,2342  55'204 1            TS     JPINDEX
 0194   REF  31 LAST 325     26,2343  0 5225 1            TC     POSTJUMP
 0195   REF   1             26,2344   62165 1            CADR   DOV73
 0196   REF   8 LAST 324     26,2345  0 4161 0  JPEND75   TC     PHASCHNG
01961                       26,2346   05026 0            OCT    05026
01962                       26,2347   33000 1            OCT    33000
01963                       26,2350  0 0004 0            INHINT                 INHINT BECAUSE PHASCHNG RELINTS AND BECA
C01964                                                                         USE RESTARTED JOB WILL NEED IT.
01965   REF   5 LAST 322     26,2351  51'722 1            INDEX  COMPNUMB        V75
 0197                        26,2352  0 2352 1            TC                     FAN TO V75 ROUTINES
 0198                        26,2353   02102 0  OCTID     OCT    02102
 0199   REF   1             26,2354  0 2417 1            TC     I=4
 0200                        26,2355  0 0006 1  I=1       EXTEND
 0201   REF  35 LAST 325     26,2356  3 1701 0            DCA    STBJFF +1
 0202   REF   1             26,2357  53'755 0            DXCH   RP
```

L UPDATE PROGRAM PART 2 OF 2 USER'S OWN PAGE NO. 6 S3 E4

```
0203   REF  2 LAST  70     26,2360   0 2464 0            TC     JPQJTTRM        RESTORE PRE-P27 MODE AND EXIT JPDATE
0204   REF  1             26,2361   0 2405 1            TC     I=2
0205                      26,2362    00075 0  210CT75    OCT    75
0206   REF  2 LAST 325    26,2363   0 2417 1            TC     I=4
0207                      26,2364    02101 0  STATENV    OCT    2101
0208                      26,2365   0 0006 1  I=3        EXTEND
0209   REF 36 LAST 325    26,2366   3 1701 0            DCA    STBJFF +1
0210   REF  1             26,2367   53'765 0            DXCH   R1VEC
0211                      26,2370   0 0006 1            EXTEND
0212   REF 37 LAST 326    26,2371   3 1703 1            DCA    STBJFF +3
0213   REF  2 LAST 326    26,2372   53'767 1            DXCH   R1VEC +2
0214                      26,2373   0 0006 1            EXTEND
0215   REF 38 LAST 326    26,2374   3 1705 1            DCA    STBJFF +5
0216   REF  3 LAST 326    26,2375   53'771 0            DXCH   R1VEC +4
0217                      26,2376   0 0006 1            EXTEND
0218   REF 39 LAST 326    26,2377   3 1707 0            DCA    STBJFF +7
0219   REF  1             26,2400   53'773 1            DXCH   TINT
0220                      26,2401   0 0006 1            EXTEND
0221   REF 40 LAST 326    26,2402   3 1711 1            DCA    STBJFF +9D
0222   REF  1             26,2403   53'775 1            DXCH   RCD
0223   REF  3 LAST 326    26,2404   0 2464 0            TC     JPQJTTRM        RESTORE PRE-P27 MODE AND EXIT JPDATE
0224                      26,2405   0 0006 1  I=2        EXTEND
0225   REF 41 LAST 326    26,2406   3 1701 0            DCA    STBJFF +1
0226   REF  1             26,2407   53'757 1            DXCH   CPT6/2
0227                      26,2410   0 0006 1            EXTEND
0228   REF 42 LAST 326    26,2411   3 1703 1            DCA    STBJFF +3
0229   REF  2 LAST 326    26,2412   53'761 1            DXCH   CPT6/2 +2
0230                      26,2413   0 0006 1            EXTEND
0231   REF 43 LAST 326    26,2414   3 1705 1            DCA    STBJFF +5
0232   REF  3 LAST 326    26,2415   53'763 0            DXCH   CPT6/2 +4
0233   REF  4 LAST 326    26,2416   0 2464 0            TC     JPQJTTRM        RESTORE PRE-P27 MODE AND EXIT JPDATE
02345  REF  7 LAST 323    26,2417   4 0076 1  I=4        CS     FLAGWRD2        IS ORBITAL INTEGRATION ON
0235   REF 22 LAST 323    26,2420   7 7755 0            MASK   BIT7
02355                     26,2421   0 0006 1            EXTEND
0236   REF  2 LAST 323    26,2422   1 2262 1            BZF    SETJPRCK        YES
02372  REF 44 LAST 326    26,2423   31'700 1            CAE    STBJFF +1
02374  REF  2 LAST 324    26,2424   6 1257 0            AD     TE +1
02376  REF 45 LAST 326    26,2425   55'714 0            TS     STBJFF +13D
02378  REF 95 LAST 324    26,2426   3 7767 0            CAF    ZERO
0238   REF  3 LAST 326    26,2427   6 1256 1            AD     TE
02382  REF 46 LAST 326    26,2430   55'713 1            TS     STBJFF +12D
02384  REF 96 LAST 326    26,2431   3 7767 0            CA     ZERO
02386  REF 70 LAST 315    26,2432   54 001 1            TS     L
02388  REF 12 LAST 304    26,2433   52 025 1            DXCH   TIME2
0239   REF 47 LAST 326    26,2434   53'712 0            DXCH   STBJFF +10D
02392  REF  6 LAST 285    26,2435   3 7766 1            CA     FIVE
02393  REF  1             26,2436   0 4246 0            TC     NEWPHASE
02394                     26,2437    00006 1            OCT    00006

02396                     26,2440   0 0004 0  I=4.CONT INHINT
```

L UPDATE PROGRAM PART 2 OF 2 USER'S OWN PAGE NO. 7 S3 E4

```
02398  REF  37 LAST 326    26,2441  3 7767 0          CA    ZERO
0240   REF 192 LAST 322    26,2442  54 146 0          TS    MPAC +2          FOR TPAGREE
02412                      26,2443  0 0006 1          EXTEND
02414  REF  48 LAST 326    26,2444  3 1714 1          DCA   STBJFF +12D
02416  REF   4 LAST 326    26,2445  53,257 1          DXCH  TE
02418  REF  49 LAST 327    26,2446  3 1700 1          CA    STBJFF +1
0242   REF  50 LAST 327    26,2447  6 1712 1          AD    STBJFF +11D
02422  REF  71 LAST 326    26,2450  54 001 1          TS    L
02424  REF  38 LAST 327    26,2451  3 7767 0          CA    ZERO
02426  REF  51 LAST 327    26,2452  6 1711 1          AD    STBJFF +10D
02428  REF 193 LAST 327    26,2453  52 145 0          DXCH  MPAC
0243   REF   5 LAST 265    26,2454  0 7327 0          TC    TPAGREE          FORCE SIGN AGREEMENT
02432  REF 194 LAST 327    26,2455  52 145 0          DXCH  MPAC
02434  REF  13 LAST 326    26,2456  20 025 1          DAS   TIME3            NEW CLOCK
02436  REF   7 LAST 280    26,2457  3 7765 1          CAF   SEVEN            6,7 SPOT TO RESTORE OLD PROGRAM MODE.
02437  REF   2 LAST 326    26,2460  0 4246 0          TC    NEWPHASE
02438                      26,2461   00006 1          DCT   00006

02457  REF   5 LAST 326    26,2462  0 2464 0          TC    UPQUITRM         RESTORE PRE-P27 MODE AND EXIT UPDATE
0246   REF   8 LAST 322    26,2463  0 4724 1  UPVERB34 TC    FREEDSP
02462  REF   3 LAST 322    26,2464  0 4133 1  UPQUITRM TC    CHECKMM          RESTORE MODE AND UPQUIT
02464                      26,2465   00027 1          DCT   27
02466  REF   2 LAST 325    26,2466  1 2471 0          TCF   UPQUIT
0247   REF   3 LAST 322    26,2467  3 1716 0          CA    UPOLDMOD
0248   REF   6 LAST 322    26,2470  0 4122 1          TC    NEWMODEX +3

0249   REF  24 LAST 320    26,2471  0 5206 0  UPQUIT   TC    BANKCALL         SETS 6,0 SPOT AND DOES ENDOFJOB
0250   REF   1             26,2472   62351 1          CADR  ENDUP
0259                       26,2473  0 0006 1  UPRANGE  EXTEND
0260   REF   1             26,2474  6 2503 0          BZMF  UPRAUS           C(A) LE ZERO RETURN TO Q
0261   REF 195 LAST 323    26,2475  4 0000 0          CS    A
0262   REF 196 LAST 327    26,2476  24 000 1          INCR  A
0263   REF   3 LAST 322    26,2477  6 1717 1          AD    UPTEMP
0264                       26,2500  0 0006 1          EXTEND
0265   REF   2 LAST 327    26,2501  6 2503 0          BZMF  UPRAUS           C(A) GT C(LOC) RETURN TO Q
0266   REF 157 LAST 322    26,2502  24 002 0          INCR  Q
0267   REF 158 LAST 327    26,2503  0 0002 0  UPRAUS   TC    Q                C(A) LE C(LOC) AND GT 0 RETURN TO Q+1
02671  REF   4 LAST 327    26,2504  0 4133 1  XCTALMRM TC    CHECKMM
02672                      26,2505   00027 1          DCT   27
02673                      26,2506  1 2511 1          TCF   +3
02674  REF   4 LAST 327    26,2507  3 1716 0          CA    UPOLDMOD
02675  REF   7 LAST 327    26,2510  0 4122 1          TC    NEWMODEX +3
02676  REF   9 LAST 325    26,2511  0 4161 0          TC    PHASCHNG
02677                      26,2512   00006 1          DCT   00006
0268   REF  25 LAST 327    26,2513  0 5206 0  21XCTALM TC    BANKCALL
0269   REF   4 LAST 320    26,2514   22053 1          CADR  XACTALM

0270                       26,2515   02000 0  UPE4     DCT   2000
0272                       26,2516   00003 1  ADFC     DCT   00003
0273                       26,2517   00007 0           DCT   00007
```

L UPDATE PROGRAM PART 2 OF 2 USER'S OWN PAGE NO. 8 S3 E4

```
0274                        26,2520  00013 0          OCT    00013
0275                        26,2521  00002 0          OCT    00002
0276  REF  3 LAST 322       26,2522  02320 1  JPAOFTP1 ECADR  JPTEMP1
0277  REF  52 LAST 327      26,2523  02276 0  ASTBFM1  ECADR  STBJFF -1
0278                        26,2524  00454 1  3SEC21   DEC    300
```

L DOWN-TELEMETRY PROGRAM USER'S OWN PAGE NO. 1 53

```
R0001   PROGRAM NAME- DOWN TELEMETRY PROGRAM
R0002   MOD NO.- 2
R0003   MOD BY- KILROY
R0004   DATE- 21NOV66
R0005   LOG SECTION- DOWN TELEMETRY PROGRAM
R0006   ASSEMBLY- REV 12 OF SUNBURST
R0007   FUNCTIONAL DESCRIPTION- THIS ROUTINE IS INITIATED BY TELEMETRY END
R0008           PULSE FROM THE DOWNLINK TELEMETRY CONVERTER. THIS PULSE OCCURS
R0009           AT 50 TIMES PER SEC(EVERY 20 MS) THEREFORE DODOWNTM IS
R0010           EXECUTED AT THESE RATES. THIS ROUTINE SELECTS THE APPROPRIATE
R0011           LGC DATA TO BE TRANSMITTED DOWNLINK AND LOADS IT INTO OUTPUT
R0012           CHANNELS 34 AND 35. THE INFORMATION IS THEN GATED OUT FROM THE
R0013           LGC IN SERIAL FASHION.
R00131          THIS PROGRAM IS CODED FOR A 2 SECOND DOWNLIST. SINCE DOWNRUPTS
R00132          OCCUR EVERY 20MS AND 2 LGC COMPUTER WORDS CAN BE PLACED IN
R00133          CHANNELS 34 AND 35 DURING EACH DOWNRUPT THE PROGRAM IS CAPABLE
R00134          OF SENDING 200 LGC WORDS EVERY 2 SECONDS.
R0014   CALLING SEQUENCE- NONE
R0015           PROGRAM IS ENTERED VIA TCF DODOWNTM WHICH IS EXECUTED AS A
R0016           RESULT OF A DOWNRUPT. CONTROL IS RETURNED VIA TCF RESUME WHICH
R0017           IN EFFECT IS A RESUME.
R0018   SUBROUTINES CALLED- NONE
R0019   NORMAL EXIT MODE- TCF RESUME
R0020   ALARM OR ABORT EXIT MODE- NONE
R00201  RESTART PROTECTION- NONE.
R00202          EXCEPT THAT WHEN A RESTART DOES OCCUR :STARTSUB: WILL
R00203          INITIALIZE THE DOWNLIST POINTER TO THE BEGINNING OF THE NOMINAL
R00204          DOWNLIST. THIS HAS THE EFFECT OF IGNORING THE REMAINDER OF THE
R00205          DOWNLIST WHICH THE DOWN-TELEMETRY PROGRAM WAS WORKING ON WHEN
R00206          THE RESTART OCCURRED.
R0021   OUTPUT-  EVERY 2 SECONDS 100 DOUBLE PRECISION WORDS(I.E. 200 LGC
R0022           COMPUTER WORDS) ARE TRANSMITTED VIA DOWNLINK.
R0023   ERASABLE INITIALIZATION REQUIRED- NONE
R0024           DNTMGOTO,DNLSTADR AND EBANK ARE INITIALIZED IN STARTSUB(FRESH
R0025           START AND RESTART)
R0026   DEBRIS(ERASABLE LOCATIONS DESTROYED BY THIS PROGRAM)-
R0027           LDATALST,ITEMP1,ITEMP2,DNTMBUFF TO DNTMBUFF + 21D,TMINDEX,DNQ
R0028

 0029                                  15,2000          BANK   15
 0030   REF   8 LAST 215                  E7           EBANK= DNTMBUFF

 00301                                   0007  ERASZERO EQUALS 7
 00302  REF   1                          0007  DMYECADR EQUALS ERASZERO      USE DMYECADR TO GENERATE A DUMMY ECADR
 00303  REF   2 LAST 329                 0007  DMYADRES EQUALS ERASZERO      USE DMYADRES TO GENERATE A DUMMY ADRES
 00304  REF   3 LAST 329                 0007  UNKNOWN  EQUALS ERASZERO      USE UNKNOWN WHEN THE MNEMONIC IS UNKNOWN
 00305  REF   4 LAST 329                 0007  SPARE    EQUALS ERASZERO      USE SPARE TO INDICATE AVAILABLE SPACE

 0031                        15,2000   00437 1  LOWIDCOD OCT    00437
```

L DOWN-TELEMETRY PROGRAM USER'S OWN PAGE NO. 2 53

```
P0121   DODOWNTM IS ENTERED EVERY 20 MS BY AN INTERRUPT TRIGGERED BY THE
R0122   RECEIPT OF AN ENDPULSE FROM THE SPACECRAFT TELEMETRY PROGRAMMER.

R012205 THE ORGANIZATION OF THE PROGRAM IS AS FOLLOWS.....
R01221  1. A MAIN PROGRAM(DODOWNTM) WHICH CONTROLS A SERIES OF SUBROUTINES.
R012215 2. SUBROUTINES(SENDID,SENDSNAP ETC.) WHICH ARE DESIGNED TO HANDLE
R01222     SPECIFIC PORTIONS OF THE DOWNLIST.
R012225 3. 'EQUALS' CARDS(NDP1, NDP2, LINCR) WHICH DEFINE NO. OF ITEMS IN THE
R01223     PORTIONS OF THE DOWNLISTS.
R012235 4. DOWNLISTS. - DOWNLISTS MUST BE COMPILED IN THE SAME BANK AS THE
R01224     DOWN-TELEMETRY PROGRAM. THIS IS DONE FOR EASE OF CODING, FASTER
R012245    EXECUTION AND TO INSURE THAT THE DOWNLIST ID'S(FIRST WORD OF EACH
R01225     2 SEC DOWNLIST.) ARE UNIQUE. THE LOCATION OF THE AGS DOWNLIST MUST BE
R012255    2001 OF THE FBANK IN WHICH THE DOWN-TELEMETRY PROGRAM RESIDES.
R01226     (I.E. AGSLIST = XX,2001). THIS WILL MAKE THE ID WORD FOR THE AGS
R012265    DOWNLINK DATA = 00001.
R01227

 0123   REF   6 LAST 229    15,2001  54 016 1  DODOWNTM TS      BANKRUPT
 0124                       15,2002  0 0006 1           EXTEND
 01245  REF   6 LAST 229    15,2003  22 012 1           DXCH    ZRUPT
 0125   REF   5 LAST 215    15,2004  51'401 0           INDEX   DNTMGOTO      GO TO APPROPRIATE
 0126                       15,2005  1 0000 0           TCF     0             TELEMETRY PHASE
 0127   REF   1             15,2006  0 2032 1  DNPHASE1 TC      SENDID        SEND ID WORD(S)
 0128   REF   23 LAST 326   15,2007  3 7755 1           CAF     BIT7          SET WORD ORDER
 0129                       15,2010  0 0006 1           EXTEND                BACK TO 1 FOR
 0130                       15,2011  05 013 0           MOR     13            REMAINDER OF CYCLE
 0131   REF   1             15,2012  3 2235 1           CA      DNLINCR       CALCULATE ADDRESS OF
 0132   REF   1             15,2013  27'400 0           ADS     LDATALST      SNAPSHOT WORDS TO BE SENT  (GROUP 1)
 0133   REF   1             15,2014  0 2046 1           TC      SNAPSHOT      SAVE AND SEND SNAPSHOT WORDS  (GROUP 1)
 0134   REF   1             15,2015  3 2233 1           CA      DNDP1-1       PLACE NO. OF DP WORDS IN GROUP 1 INTO A
 0135   REF   1             15,2016  0 2116 0           TC      SENDDP        SEND DOUBLE PRECISION WORDS (GROUP 1)
 0136   REF   1             15,2017  0 2152 0           TC      SENDCH        SEND CHANNELS 11-14 AND 31-33
 0137   REF   1             15,2020  0 2206 1           TC      SENDDSTB      SEND DISPLAY TABLES
 0138   REF   1             15,2021  0 2226 0           TC      SENDTIME      SEND TIME1 AND TIME2
 0139   REF   1             15,2022  4 2112 0           CS      DNSNAP        CALCULATE ADDRESS OF
 0140   REF   2 LAST 330    15,2023  27'400 0           ADS     LDATALST      SNAPSHOT WORDS TO BE SENT(GROUP 2)
 0141   REF   2 LAST 330    15,2024  0 2046 1           TC      SNAPSHOT      SAVE AND SEND SNAPSHOT WORDS  (GROUP 2)
 0142   REF   1             15,2025  3 2234 0           CA      DNDP2-1       PLACE NO. OF DP WORDS IN GROUP 2
 0143   REF   2 LAST 330    15,2026  0 2116 0           TC      SENDDP        SEND DOUBLE PRECISION WORDS(GROUP 2)
 0144   REF   2 LAST 330    15,2027  0 2152 0           TC      SENDCH        SEND CHANNELS 11-14 AND 31-33
 0145   REF   2 LAST 330    15,2030  0 2206 1           TC      SENDDSTB      SEND DISPLAY TABLE
 0146   REF   2 LAST  98    15,2031  1 2006 1           TCF     DNPHASE1      GO BACK AND START OVER


A0147                                                  ..........................................................................
 0148   REF   3 LAST 212    15,2032  3 0411 0  SENDID   CA      DNLSTADR      INITIALIZE DOWNLIST ADDRESS AS SELECTED
 0149   REF   3 LAST 330    15,2033  55'400 0           TS      LDATALST      BY A MISSION OR TEST PROGRAM
 0150   REF   24 LAST 330   15,2034  4 7755 0           CS      BIT7          SET WORD
 0151                       15,2035  0 0006 1           EXTEND                ORDER BIT 7 IN
```

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 0152                          15,2036  03 013 0          WAND   13          CHANNEL 13 TO 0

 0153                          15,2037  0 0006 1          EXTEND             SET UP DNTMGOTO SO NEXT ENTRY TO
 0154  REF   6 LAST 330       15,2040  23'401 0          QXCH   DNTMGOTO    DODOWNTM WILL TRANSFER CONTROL TO
A0155                                                                       THE INSTRUCTION AFTER TC SENDID.

 0156  REF   1                 15,2041  3 2000 0          CAF    LOWIDCOD    PLACE SPECIAL ID CODE INTO L
 0157  REF  72 LAST 327       15,2042  54 001 1          TS     L

 0158  REF   4 LAST 330       15,2043  3 1400 1          CA     LDATALST    ISOLATE RELATIVE LOC OF DOWNLIST IN THIS
 0159  REF   3 LAST 306       15,2044  7 5337 1          MASK   LOW10       FIXED BANK. RESULT = 0000 - 1777. NO
A0160                                                                       CONFLICT OF DUPLICATE ID WORDS CAN OCCUR

 0161  REF   1                 15,2045  1 2140 1          TCF    DNTMEXIT    SEND LIST ID WORD AND SPECIAL ID CODE


A0162                          ..........................................................................
 0163                          15,2046  0 0006 1  SNAPSHOT EXTEND
 0164  REF   1                 15,2047  23'406 1          QXCH   DNQ         SAVE RETURN ADDRESS
 0165  REF  99 LAST 327       15,2050  3 7767 0          CAF    ZERO        INITIALIZE THE
 0166  REF  50 LAST 222       15,2051  54 061 1          TS     ITEMP1      DNTMBUFF INCREMENTER(ITEMP1) TO ZERO.
 0167  REF   1                 15,2052  3 2114 1          CAF    DNSNAP-2    INITIALIZE LOOP COUNTER(ITEMP2) TO
 0168  REF  23 LAST 222       15,2053  54 062 1  SNAPLOOP TS     ITEMP2      TOTAL NO. OF SNAPSHOT DP WORDS LESS 2.
 0169  REF   5 LAST 331       15,2054  6 1400 1          AD     LDATALST    CALCULATE ADDRESS OF NEXT
 0170                          15,2055  0 0006 1          EXTEND             ENTRY IN DOWNLIST.
 0171  REF 187 LAST 327       15,2056  5 0000 1          INDEX  A           PICK UP THE DOUBLE PRECISION WORD FROM
 0171                          15,2057  5 0000 1          INDEX  0           THE NEXT ENTRY
 0172                          15,2060  3 0001 0          DCA    0           IN THE DOWNLIST.
 0173  REF  51 LAST 331       15,2061  50 061 0          INDEX  ITEMP1      AND SAVE IT IN THE NEXT AVAILABLE LOC
 0174  REF   9 LAST 329       15,2062  53'410 1          QXCH   DNTMBUFF    IN DNTMBUFF SNAPSHOT BUFFER.
 0175  REF  40 LAST 321       15,2063  3 7762 0          CAF    TWO         INCREMENT DNTMBUFF INCREMENTER(ITEMP1)
 0176  REF  52 LAST 331       15,2064  26 061 1          ADS    ITEMP1      BY 2.
 0177  REF  24 LAST 331       15,2065  10 062 1          CCS    ITEMP2      HAVE ALL SNAPSHOT DP WORDS BEEN SAVED...
 0178  REF   1                 15,2066  1 2053 1          TCF    SNAPLOOP    NO--GO BACK AND CONTINUE SAVING THEM
 0179  REF   1                 15,2067  3 2113 0          CAF    DNSNAP-1    YES--PLACE NO. OF DP WORDS REMAINING
 0180  REF   1                 15,2070  55'402 1          TS     TMINDEX     TO BE SENT INTO TMINDEX.
 0181  REF   1                 15,2071  3 2115 0          CAF    LSENDSNP    SET UP DNTMGOTO SO PROGRAM CONTROL WILL
 0182  REF   7 LAST 331       15,2072  55'401 1          TS     DNTMGOTO    BE TRANSFERRED TO SENDSNAP ON NEXT
A0183                                                                       ENTRY TO DODOWNTM.
 0184                          15,2073  0 0006 1          EXTEND             PICK UP FIRST DP SNAPSHOT WORD
 0185  REF   6 LAST 331       15,2074  5 1400 1          INDEX  LDATALST    AND PLACE IT IN A + L.
 0186  REF   1                 15,2075  5 0013 0          INDEX  NSNAP -1    (((THIS ADDITIONAL CODING ALTHOUGH A BIT
 0187                          15,2076  3 0001 0          DCA    0           SUPERFLUOUS IS JUSTIFIED BECAUSE IT
A0188                                                                       SAVES 2 WORDS OF ERASABLE STORAGE)))
 0189  REF   2 LAST 331       15,2077  1 2140 1          TCF    DNTMEXIT    GO SEND FIRST SNAPSHOT DP ENTRY.
 0190  REF   2 LAST 331       15,2100  11'402 1  SENDSNAP CCS    TMINDEX     ANY SNAPSHOT WORDS LEFT IN BUFFER
 0191                          15,2101  1 2103 0          TCF    +2          YES--GO PROCESS THEM
 0192  REF   2 LAST 331       15,2102  0 1406 1          TC     DNQ         NO--RETURN TO INSTRUCTION AFTER
A0193                                                                                                  TC SNAPSHOT.
```

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0194  REF   3 LAST 331    15,2103  55'402 1          TS      TMINDEX     SAVE COUNT OF SNAPSHOT WORDS REMAINING
0195                      15,2104  6 0000 1          DOUBLE              CALCULATE DECREMENTER
0196                      15,2105  4 0000 0          COM                 FOR NEXT DP WORD IN
0197                      15,2106  0 0006 1          EXTEND              BUFFER.
0198  REF 188 LAST 331    15,2107  5 0000 1          INDEX   A
0199  REF  10 LAST 331    15,2110  3 1434 0          DCA     DNTMBUFF +20D   TAKE NEXT DP WORD OUT OF BUFFER, PLACE
0200  REF   3 LAST 331    15,2111  1 2140 1          TCF     DNTMEXIT    IT INTO A + L AND GO SEND IT.
0201                            0014  NSNAP   EQUALS  12D                 NUMBER OF DP SNAPSHOT WORDS.
0202  REF   2 LAST 331    15,2112  00014 1  DNSNAP   ADRES   NSNAP       NO. OF DP SNAPSHOT WORDS  CONSTANT
0203  REF   3 LAST 332    15,2113  00013 0  DNSNAP-1 ADRES   NSNAP -1    NO. OF DP SNAPSHOT WORDS -1  CONSTANT
0204  REF   4 LAST 332    15,2114  00012 1  DNSNAP-2 ADRES   NSNAP -2    NO. OF DP SNAPSHOT WORDS -2  CONSTANT
0205  REF   1              15,2115  02100 1  LSENDSNP ADRES   SENDSNAP    LOC OF ROUTINE WHICH SENDS SNAPSHOT BUFF

A0206                     ..........................................................................
0207                      15,2116  0 0006 1  SENDDP   EXTEND              ENTER WITH NO. DP WORDS REMAINING TO
0208  REF   3 LAST 331    15,2117  23'406 1          QXCH    DNQ         BE SENT IN A. SAVE RETURN ADDRESS.
0209  REF   4 LAST 332    15,2120  55'402 1          TS      TMINDEX     PLACE NO. OF DP WORDS TO BE SENT AFTER
0210  REF  84 LAST 321    15,2121  6 7763 1          AD      ONE         THIS ONE INTO TMINDEX. CALCULATE NEXT
0211                      15,2122  4 0000 0          COM                 LOCATION IN DOWNLIST AND SAVE
0212  REF   7 LAST 331    15,2123  27'400 0          ADS     LDATALST    IT IN LDATALST.
0213  REF   1              15,2124  3 2151 0          CAF     LSENDDPA    SET UP DNTMGOTO SO PROGRAM CONTROL WILL
0214  REF   8 LAST 331    15,2125  55'401 1          TS      DNTMGOTO    GO TO SENDDPA ON NEXT ENTRY TO DODOWNTM.
0215  REF   5 LAST 332    15,2126  31'402 0          CAE     TMINDEX     PLACE NO. OF WORDS REMAINING TO BE SENT
0216  REF   6 LAST 332    15,2127  55'402 1  SENDDPB  TS      TMINDEX     INTO A. SAVE NO. DP WORDS TO BE SENT.
0217  REF   8 LAST 332    15,2130  6 1400 1          AD      LDATALST    CALCULATE NEXT DOWNLIST ENTRY.
0218  REF 189 LAST 332    15,2131  50 000 1          INDEX   A
0219                      15,2132  3 0000 1          CA      0           PICK UP ECADR OF NEXT DOWNLIST ENTRY.
0220  REF  16 LAST 321    15,2133  54 003 0          TS      EBANK       SET EBANK.
0221  REF   6 LAST 302    15,2134  7 4564 0          MASK    LOW8        ISOLATE RELATIVE ADDRESS.
0222                      15,2135  0 0006 1          EXTEND
0223  REF 190 LAST 332    15,2136  5 0000 1          INDEX   A           PICK UP DOUBLE PRECISION
0224                      15,2137  3 1401 0          DCA     3400        WORD INTO A + L.  (DCA 3400 = DCA 1400)

0225                      15,2140  0 0006 1  DNTMEXIT EXTEND              GENERAL DOWN-TELEMETRY EXIT
0226  REF   1              15,2141  01 034 1          WRITE   DNTM1       TO SEND A + L TO CHANNELS 34 + 35
0227  REF  73 LAST 331    15,2142  3 0001 0          CA      L           RESPECTIVELY.

0228                      15,2143  0 0006 1  TMEXITL  EXTEND              ALTERNATE DOWN TELEMETRY EXIT
0229  REF   1              15,2144  01 035 0          WRITE   DNTM2       TO SEND A TO CHANNEL 35.
0230  REF  17 LAST 230    15,2145  1 5733 1          TCF     RESUME      EXIT DOWN TELEMETRY PROG VIA RESUME.

0231  REF   7 LAST 332    15,2146  11'402 1  SENDDPA  CCS     TMINDEX     ANY DP WORDS REMAINING TO BE SENT.
0232  REF   1              15,2147  1 2127 0          TCF     SENDDPB     YES--GO SEND THEM.
0233  REF   4 LAST 332    15,2150  0 1406 1          TC      DNQ         RETURN TO INSTR AFTER TC SENDDP.
0234  REF   1              15,2151  02146 0  LSENDDPA ADRES   SENDDPA    LOC OF ROUTINE WHICH SENDS DP WORDS.

A0235                     ..........................................................................
0236                      15,2152  0 0006 1  SENDCH   EXTEND
```

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 0237   REF   5 LAST 332     15,2153  23'406 1            DXCH   DNQ          SAVE RETURN ADDRESS
 0238   REF   1             15,2154   3 2175 0            CAF    LSENDCHA      SET UP DNTMGOTO SO PROG CONTROL WILL GO
 0239   REF   9 LAST 332     15,2155  55'401 1            TS     DNTMGOTO      TO SENDCHA ON NEXT ENTRY TO DODOWNTM.
 0240   REF  14 LAST 319     15,2156   3 6311 1            CAF    THREE         PLACE NO. OF PAIRS OF CHANNELS TO BE
A0241                                                                           SENT AFTER THIS PAIR INTO A.
 0243   REF   8 LAST 332     15,2157  55'402 1  SENDCHB    TS     TMINDEX       SAVE NO. OF PAIRS OF CHANNELS REMAINING
 0244                        15,2160   0 0006 1            EXTEND               TO BE SENT INTO A. PICK UP CHANNEL
 0245   REF 191 LAST 332     15,2161   5 0000 1            INDEX  A             ADDRESS FROM
 0246   REF   1             15,2162   5 2202 0            INDEX  FIXLSTCL      NEXT ENTRY IN FIXLSTCL.
 0247                        15,2163  00 000 1            READ   0             PLACE CONTENTS OF THE
 0248   REF  74 LAST 332     15,2164  54 001 1            TS     L             CHANNEL INTO L.
 0249                        15,2165   0 0006 1            EXTEND               PICK UP NEXT CHANNEL
 0250   REF   9 LAST 333     15,2166   5 1402 0            INDEX  TMINDEX       ADDRESS FROM NEXT ENTRY
 0251   REF   1             15,2167   5 2176 0            INDEX  FIXLSTCA      IN FIXLSTCA.
 0252                        15,2170  00 000 1            READ   0             PLACE CONTENTS OF CHANNEL INTO A.
 0253   REF   4 LAST 332     15,2171   1 2140 1            TCF    DNTMEXIT      NOW GO SEND A + L.
 0254   REF  10 LAST 333     15,2172  11'402 1  SENDCHA    CCS    TMINDEX       ANY MORE CHANNEL PAIRS TO BE SENT.....
 0255   REF   1             15,2173   1 2157 1            TCF    SENDCHB       YES--GO SEND THEM.
 0256   REF   6 LAST 333     15,2174   0 1406 1            TC     DNQ           NO--RETURN TO INSTR AFTER TC SENDCH.
 0257   REF   1             15,2175   02172 1  LSENDCHA   ADRES  SENDCHA       LOCATION OF ROUTINE WHICH SENDS CHANNELS
 0258                        15,2176   00032 0  FIXLSTCA   OCT    32            CHANNEL 32
 0259                        15,2177   00030 1             OCT    30            CHANNEL 30
 0260                        15,2200   00013 0             OCT    13            CHANNEL 13
 0261                        15,2201   00011 1             OCT    11            CHANNEL 11
 0262                        15,2202   00033 1  FIXLSTCL   OCT    33            CHANNEL 33
 0263                        15,2203   00031 0             OCT    31            CHANNEL 31
 0264                        15,2204   00014 1             OCT    14            CHANNEL 14
 0265                        15,2205   00012 1             OCT    12            CHANNEL 12

A0266                                                    ..........
 0267                        15,2206   0 0006 1  SENDDSTB   EXTEND
 0268   REF   7 LAST 333     15,2207  23'406 1            DXCH   DNQ           SAVE RETURN ADDRESS
 0269   REF   1             15,2210   3 2225 0            CAF    LSENDDSA      SET UP DNTMGOTO SO PROGRAM CONTROL WILL
 0270   REF  10 LAST 333     15,2211  55'401 1            TS     DNTMGOTO      GO TO SENDDSA ON NEXT ENTRY TO DODOWNTM.
 0271   REF   7 LAST 326     15,2212   3 7766 1            CAF    FIVE          PLACE NO. OF PAIRS OF DSPTAB WORDS REM
 0272   REF  11 LAST 333     15,2213  55'402 1  SENDDSB    TS     TMINDEX       AFTER THIS PAIR INTO A. SAVE NO. REMAIN-
 0273                        15,2214   6 0000 1            DOUBLE               ING INTO TMINDEX. CALCULATE DECREMENTER
 0274                        15,2215   4 0000 0            COM                  FOR NEXT PAIR OF WORDS(SP)
 0275                        15,2216   0 0006 1            EXTEND               IN DSPTAB.
 0276   REF 192 LAST 333     15,2217   5 0000 1            INDEX  A             PICK UP PAIR OF DSPTAB WORDS(SP) AND
 0277   REF  44 LAST 315     15,2220   3 0326 0            DCA    DSPTAB +10D   LEAVE THEM IN A + L.
 0278   REF   5 LAST 333     15,2221   1 2140 1            TCF    DNTMEXIT      NOW GO SEND A + L.
 0279   REF  12 LAST 333     15,2222  11'402 1  SENDDSA    CCS    TMINDEX       ANY WORDS LEFT IN DSPTAB TO BE SENT.....
 0280   REF   1             15,2223   1 2213 1            TCF    SENDDSB       YES--GO SEND THEM
 0281   REF   8 LAST 333     15,2224   0 1406 1            TC     DNQ           NO--RETURN TO INSTR AFTER TC SENDDSTB.
 0282   REF   1             15,2225   02222 1  LSENDDSA   ADRES  SENDDSA       LOC OF ROUTINE WHICH SENDS DISPLAY TABLE

A0283                                                   ..........
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 0284                          15,2226  0 0006 1  SENDTIME EXTEND
 0285   REF  11 LAST 333       15,2227  23,401 0          DXCH   DNTMGOTO     GO TO INSTRUCTION AFTER TC SENDTIME.
02851                          15,2230  0 0006 1          EXTEND
 0286   REF  14 LAST 327       15,2231  3 0025 0          DCA    TIME2        PLACE TIME2 AND TIME1 INTO A AND L.
 0287   REF   6 LAST 333       15,2232  1 2140 1          TCF    DNTMEXIT     NOW GO SEND A AND L.

A0288                          ..................................................................
 0289   REF   1                15,2233  00032 0  DNDP1-1  ADRES  NDP1 -1      NO. OF DP WORDS IN GROUP 1 LESS 1
 0290   REF   1                15,2234  00032 0  DNDP2-1  ADRES  NDP2 -1      NO. OF DP WORDS IN GROUP 2 LESS 1
 0291   REF   1                15,2235  00102 1  DNLINCR  ADRES  LINCR        RELATIVE LOC OF FIRST GROUP IN DOWNLIST.
A0292                          ..................................................................
A0293                          ******************************************************************
A0294                          CHANGE THE FOLLOWING 3 EQUALS CARDS WHEN MODIFYING THE STRUCTURE OF THE
A0295                          DOWNLISTS.
 0296                    0033  NDP1     EQUALS 27D      NUMBER OF DP WORDS  (GROUP 1)
 0297                    0033  NDP2     EQUALS 27D      NUMBER OF DP WORDS  (GROUP 2)
 0298                    0102  LINCR    EQUALS 66D      LINCR   = NDP1 + NDP2 + 12D
A0299                          ******************************************************************
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L       DOWN-TELEMETRY PROGRAM                                          USER'S OWN PAGE NO.  7          S3  E7

P0300   NOMINAL SUNBURST (AS206) 2 SECOND DOWNLIST
R03001  AS OF DATE = 02FEB67

R0301   LAST ENTRY IN DOWNLIST WILL BE SENT FIRST, THEN LAST ENTRY - 1  ETC.----
 0302                                   15,2236  NOMDNLST EQUALS
 03025  REF   2 LAST  99                15,2236  JPDNLIST EQUALS NOMDNLST        NOT USED IN 206.
A0303                                           ----------DISPLAY TABLES----------
A0304                                                                           DSPTAB +10D AND DSPTAB +11D
A0305                                                                           DSPTAB +8D AND DSPTAB +9D
A0306                                                                           DSPTAB +6  AND DSPTAB +7
A0307                                                                           DSPTAB +4  AND DSPTAB +5
A0308                                                                           DSPTAB +2  AND DSPTAB +3
A0309                                                                           DSPTAB     AND DSPTAB +1
A0310                                           ----------CHANNELS----------
A0311                                                                           CHANNELS 32 AND 33
A0312                                                                           CHANNELS 30 AND 31
A0313                                                                           CHANNELS 13 AND 14
A0314                                                                           CHANNELS 11 AND 12
A0315                                           ----------DOUBLE PRECISION - ANY EBANK  (GROUP 2)----------
 0316   REF  23 LAST 220        15,2236  00076 0        ECADR  STATE +2         (FLAGWRD2,DAPBOOLS) FLAGWORDS
 0317   REF  24 LAST 335        15,2237  00074 1        ECADR  STATE            (STATE,FLAGWRD1) FLAGWORDS
 0318   REF   2 LAST  47        15,2240  03017 1        ECADR  OMEGAR -1        (GARBAGE,OMEGAR) ANGULAR RATES ABOUT THE
 0319   REF   5 LAST  49        15,2241  03015 0        ECADR  OMEGAP           (OMEGAP,OMEGAQ) P,Q,R BODY AXES  (DAP)
A03195                                                                          SCALED AT 45 DEG/SEC.
 0320   REF   3 LAST 163        15,2242  00033 1        ECADR  CDUY             (CDUY,CDUZ) ACTUAL CDU:S
 0321   REF   9 LAST 295        15,2243  00031 0        ECADR  CDUX -1          (GARBAGE,CDUX) ACTUAL CDU:S
 0322   REF   2 LAST  39        15,2244  02343 1        ECADR  RD +4            APS2 DESIRED RADIUS VECTOR IN STABLE
 0323   REF   3 LAST 335        15,2245  02341 0        ECADR  RD +2            MEMBER CO-ORDINATES.
 0324   REF   4 LAST 335        15,2246  02337 1        ECADR  RD               SCALED METERS X 2(-25).
 0325   REF   3 LAST  41        15,2247  02327 0        ECADR  VDVECT +4        APS2,DPS1 DESIRED VELOCITY VECTOR IN
 0326   REF   4 LAST 335        15,2250  02325 1        ECADR  VDVECT +2        STABLE MEMBER CO-ORDINATES.
 0327   REF   5 LAST 335        15,2251  02323 1        ECADR  VDVECT           SCALED M/CS X 2(-7).
 0328   REF   1                 15,2252  02335 0        ECADR  VGVECT +4        APS2,DPS1 VELOCITY TO BE GAINED SCALED
 0329   REF   2 LAST 335        15,2253  02333 0        ECADR  VGVECT +2        M/CS X 2(-7). IN LOCAL VERTICAL (APS2)
 0330   REF   3 LAST 335        15,2254  02331 1        ECADR  VGVECT           OR STABLE MEMBER (DPS1).
 0331   REF   3 LAST  67        15,2255  02345 1        ECADR  TTGO             ESTIMATED TIME TO GO IN CS(APS2,DPS1,2).
 0332   REF   2 LAST  90        15,2256  00764 1        ECADR  PHASENUM         (PHASENUM,1/PIPADT)PRESENT MISSION PHASE
A03325                                                                          , IMU COMP TIME BASE OR DT IN C.S.
 0333   REF   3 LAST 102        15,2257  01166 1        ECADR  MTIMER2          (MTIMER2,MTIMER1) REGISTERS CONTAINING
 0334   REF   5 LAST 102        15,2260  01164 0        ECADR  MTIMER4          (MTIMER4,MTIMER3) DELTA T:S OF MP:S.
 0335   REF   3 LAST 102        15,2261  01172 1        ECADR  MPHASE2          (MPHASE2,MPHASE1) REGISTERS CONTAINING
 0336   REF   3 LAST 102        15,2262  01170 0        ECADR  MPHASE4          (MPHASE4,MPHASE3) MP:S TO BE CALLED.
 0337   REF   1                 15,2263  02551 1        ECADR  DELAREA          SCALED IN UNITS OF 2(7) PERCENT INCREASE
 0338   REF   2 LAST  89        15,2264  01143 0        ECADR  LMPIN            (LMPIN,LMPOUT)
 0339   REF  14 LAST 106        15,2265  01141 1        ECADR  LMPCMD +6        OUTPUT TO LMP = REGISTERS
 0340   REF  15 LAST 335        15,2266  01137 0        ECADR  LMPCMD +4        CONTAINING THE
 0341   REF  16 LAST 335        15,2267  01135 1        ECADR  LMPCMD +2        LAST EIGHT LMP COMMANDS
 0342   REF  17 LAST 335        15,2270  01133 1        ECADR  LMPCMD           TO BE SENT BY THE LGC.
A0343                                           ----SNAPSHOT DP WORDS FROM EBANK E7 OR UNSWITCHABLE ERASABLE(GROUP 2)---
 0344   REF   4 LAST 335        15,2271  00033 1        ADRES  CDUY             (CDUY,CDUZ)
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 0345   REF   5 LAST 335     15,2272   00033 1          ADRES  CDUY          (CDUY,CDUZ)
 0346   REF   1              15,2273   01320 1          ADRES  MASS          MASS  SCALED IN UNITS OF 2(15) CGS.
 0347   REF  25 LAST 335     15,2274   00100 0          ADRES  STATE +4      (STATE +4,GARBAGE) LAMBERT FLAGS
 0348   REF   2 LAST 147     15,2275   00041 1          ADRES  PIPAZ         (PIPAZ,GARBAGE) ACTUAL Z PIP COUNTS.
 0349   REF   3 LAST 295     15,2276   00037 0          ADRES  PIPAX         (PIPAX,PIPAY) ACTUAL X,Y PIP COUNTS.
 0350   REF   7 LAST 315     15,2277   01364 1          ADRES  ALMCADR +1    (ALMCADR +1,ERCOUNT)ALM LOC BBCON,SLFCK
A03505                                                                      FAIL COUNTER.
 0351   REF  17 LAST 315     15,2300   01362 1          ADRES  FAILREG +2    (FAILREG +2,ALMCADR)ALM CODE,ALM LOC Q.
 0352   REF  18 LAST 336     15,2301   01360 0          ADRES  FAILREG       (FAILREG, +1)LAST AND PREV. ALARM CODES.
 0353   REF   1              15,2302   01567 1          ADRES  COMPTORK +4   E)GYROCOMPASS GYRO TORQUES IN VERTICAL.
 0354   REF   2 LAST 336     15,2303   01565 0          ADRES  COMPTORK +2   S)SOUTH, EAST SYSTEM,ERATE NOT INCLUDED.
 0355   REF   3 LAST 336     15,2304   01563 0          ADRES  COMPTORK      V) 37777,37777 = (1 - 2(-28))REVS.
A0356                                          ----------LGC CLOCK----------
A0357                                                                      TIME2 AND TIME1
A0358                                          ----------DISPLAY TABLES----------
A0359                                                                      DSPTAB +10D AND DSPTAB +11D
A0360                                                                      DSPTAB +8D AND DSPTAB +9D
A0361                                                                      DSPTAB +6  AND DSPTAB +7
A0362                                                                      DSPTAB +4  AND DSPTAB +5
A0363                                                                      DSPTAB +2  AND DSPTAB +3
A0364                                                                      DSPTAB     AND DSPTAB +1
A0365                                          ----------CHANNELS----------
A0366                                                                      CHANNELS 32 AND 33
A0367                                                                      CHANNELS 30 AND 31
A0368                                                                      CHANNELS 13 AND 14
A0369                                                                      CHANNELS 11 AND 12
A0370                                          ----------DOUBLE PRECISION - ANY EBANK  (GROUP 1)----------
 0371   REF  26 LAST 336     15,2305   00076 0          ECADR  STATE +2      (FLAGWRD2,DAPBOOLS) FLAGWORDS
 0372   REF  27 LAST 336     15,2306   00074 1          ECADR  STATE         (STATE,FLAGWRD1) FLAGWORDS
 0373   REF   3 LAST 335     15,2307   03017 1          ECADR  OMEGAR -1     (GARBAGE,OMEGAR) ANGULAR RATES ABOUT THE
 0374   REF   6 LAST 335     15,2310   03015 0          ECADR  OMEGAP        (OMEGAP,OMEGAQ) P,Q,R BODY AXES  (DAP)
A03745                                                                     SCALED AT 45 DEG/SEC.
 0375   REF   6 LAST 336     15,2311   00033 1          ECADR  CDUY          (CDUY,CDUZ) ACTUAL CDU:S
 0376   REF  10 LAST 335     15,2312   00031 0          ECADR  CDUX -1       (GARBAGE,CDUX) ACTUAL CDU:S
 0377   REF   3 LAST  92     15,2313   01356 0          ECADR  REDOCTR       (REDOCTR,SFAIL)RESTART CTR,SLFCK FAIL Q.
 0378   REF   1              15,2314   02267 0          ECADR  TIGN          TIME FOR ENGINE ON IN CS (MPAC'S 9,11,13).
 0379   REF   4 LAST  55     15,2315   03260 0          ECADR  AOSQ          (AOSQ,AOSR) MOMENT OFFSET(Q,R)
A03795                                                                     SCALED AT 90 DEG/SEC/SEC.
 0380   REF   1              15,2316   02570 1          ECADR  FC            THRUST COMMAND SCALED 3 LBS X 2(-14).
 0381   REF   1              15,2317   01311 0          ECADR  TEVENT        TIME OF GRR, LIFTOFF, ENGINE ON/OFF (CS)
 0382   REF  59 LAST 311     15,2320   00365 1          ECADR  IMODES30      (IMODES30,IMODES33) PGNCS FLAGWORDS
 0383   REF  53 LAST 328     15,2321   02313 1          ECADR  STBUFF +12D   STBUFF = 14 REGISTERS
 0384   REF  54 LAST 336     15,2322   02311 0          ECADR  STBUFF +10D   IN WHICH THE UPLINKED DATA
 0385   REF  55 LAST 336     15,2323   02307 1          ECADR  STBUFF +8D    IS PLACED FOR GROUND
 0386   REF  56 LAST 336     15,2324   02305 0          ECADR  STBUFF +6     DISPLAY AND VERIFICATION
 0387   REF  57 LAST 336     15,2325   02303 0          ECADR  STBUFF +4     BEFORE PLACEMENT
 0388   REF  58 LAST 336     15,2326   02301 1          ECADR  STBUFF +2     IN THE APPROPRIATE
 0389   REF  59 LAST 336     15,2327   02277 1          ECADR  STBUFF        ERASABLE LOCATIONS.
 0390   REF   6 LAST 322     15,2330   02315 1          ECADR  STCOUNT       (STCOUNT,UPOLDMD)
 0391   REF   5 LAST 322     15,2331   02321 0          ECADR  UPVERB        (UPVERB,COMPNUMB)
```

L DOWN-TELEMETRY PROGRAM USER'S OWN PAGE NO. 9 S3 E7

```
 0392   REF   1              15,2332   03021 1          ECADR  ALPHAR          (ALPHAR,GARBAGE)DIST. ACC. ABOUT R-AXIS
 0393   REF    3 LAST 335    15,2333   01143 0          ECADR  LMPIN           (LMPIN,LMPOUT)
 0394   REF   18 LAST 335    15,2334   01141 1          ECADR  LMPCMD +6       OUTPUT TO LMP = REGISTERS
 0395   REF   19 LAST 337    15,2335   01137 0          ECADR  LMPCMD +4       CONTAINING THE
 0396   REF   20 LAST 337    15,2336   01135 1          ECADR  LMPCMD +2       LAST EIGHT LMP COMMANDS
 0397   REF   21 LAST 337    15,2337   01133 1          ECADR  LMPCMD          TO BE SENT BY THE LGC.
A0398                                                ----SNAPSHOT OF WORDS FROM EBANK E7 OR UNSWITCHABLE ERASABLE(GROUP 1)---
 0399   REF   1              15,2340   00407 1          ADRES  DELV7           THE CHANGE IN VELOCITY ALONG
 0400   REF   1              15,2341   00405 0          ADRES  DELVY           EACH OF THE STABLE MEMBER AXES IN THE
 0401   REF   8 LAST 300     15,2342   00403 0          ADRES  DELVX           2 SEC INTERVAL PRECEEDING PIPTIME.
 0402   REF   1              15,2343   00767 1          ADRES  CDUYD           (CDUYD,CDUZD)  DESIRED CDU:S
 0403   REF   4 LAST 223     15,2344   00765 0          ADRES  CDUXD -1        (GARBAGE,CDUXD)  DESIRED CDU:S
 0404   REF   1              15,2345   01326 1          ADRES  STATIME         TIME FOR RN AND VN IN CENTISECONDS.
 0405   REF   1              15,2346   01022 0          ADRES  VN +4           AVE.G/ORBIT.INT. STATE VECTOR Z VEL
 0406   REF   2 LAST 337     15,2347   01020 1          ADRES  VN +2           AVE.G/ORBIT.INT. STATE VECTOR Y VEL
 0407   REF   3 LAST 337     15,2350   01016 1          ADRES  VN             AVE.G/ORBIT.INT. STATE VECTOR X VEL
A04075                                                                       VN IS SCALED METERS/CS X 2(-7).
 0408   REF   1              15,2351   01014 0          ADRES  RN +4           AVE.G/ORBIT.INT. STATE VECTOR Z POS
 0409   REF   2 LAST 337     15,2352   01012 0          ADRES  RN +2           AVE.G/ORBIT.INT. STATE VECTOR Y POS
 0410   REF   3 LAST 337     15,2353   01010 1          ADRES  RN             AVE.G/ORBIT.INT. STATE VECTOR X POS
A04105                                                                       RN IS SCALED METERS X 2(-24).
A0411                                              ----------------------ID WORDS----------------------------------
A0412                                                                        I.D., SYNCH BITS
A0413                                              --------START HERE AND READ BACK FOR CONTENTS OF DOWNLIST---------
```

L DOWN-TELEMETRY PROGRAM USER'S OWN PAGE NO. 10 S3 E7

P0430 SPECIAL DOWN-LINK PROGRAM TO SEND SAMPLES OF CDUY & Z, AND TO TURN THE DAP BACK ON.

```
0432  REF   4 LAST 331    15,2354  3 5337 0  DNCDUS   CA    LOW10          MAKE THIS ID UNIQUE.
0433  REF   2 LAST 330    15,2355  0 2033 0           TC    SENDID +1      SEND ID & EXIT.

0434  REF  25 LAST 330    15,2356  3 7755 1           CAF   BIT7           ENTER HERE THE SECOND TIME.
0435                       15,2357  0 0006 1           EXTEND
0436                       15,2360  05 013 0           WOR   13             SET WORD ORDER CODE =1
0437  REF   1              15,2361  3 2424 1           CA    LDNCDUGO
0438  REF  12 LAST 334     15,2362  55'401 1           TS    DNTMGOTO       SET DNTMGOTO FOR NEXT CDUY,Z DOWN TM PAS
0439  REF   2 LAST  90     15,2363  3 1404 0           CA    DNCDUN         INITIALIZE DOWN CDUY,Z COUNTER
R043902 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967******************

0440  REF   1              15,2364  1 3707 0           TCF   15INSRT        TERMINATE GIMBAL DRIVES, IF ANY.

R044002 **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967******************

0441  REF  85 LAST 332     15,2365  3 7763 1  DNCDUSGO CA    ONE            ENTER HERE THE THIRD TIME, & AFTER.
0442  REF  53 LAST 331     15,2366  54 061 1    +1     TS    ITEMP1         SET UP INDEX FOR CDU ERROR CHECK.
0443  REF 193 LAST 333     15,2367  50 000 1           INDEX A
0444  REF   2 LAST 337     15,2370  3 0767 1           CA    CDUYD          PICK UP CDUD FOR COMPARISON WITH CDU.
0445                       15,2371  0 0006 1           EXTEND
0446  REF  54 LAST 338     15,2372  5 0061 0           INDEX ITEMP1
0447  REF   7 LAST 336     15,2373  20 033 0           MSU   CDUY           GET DIFFERENCE BETWEEN ACTUAL CDU & CDUD
0448                       15,2374  0 0006 1           EXTEND
0449                       15,2375  6 2377 0           BZMF  +2             GET NEG OF ABSOLUTE MAG OF DIFFERENCE
0450                       15,2376  4 0000 0           COM
0451  REF   2 LAST  90     15,2377  6 1405 1           AD    CDUDMIT        COMPARE DIFFERENCE WITH ALLOWED MAXIMUM.
0452                       15,2400  0 0006 1           EXTEND
0453  REF   1              15,2401  6 2413 0           BZMF  DNCDUEND       IF ERROR IS TOO BIG, RESTORE DAP NOW.

0454  REF  55 LAST 338     15,2402  10 061 1           CCS   ITEMP1         IS CHECK COMPLETE?
0455  REF   1              15,2403  1 2366 1           TCF   DNCDUSGO +1    NO.  GO CHECK CDUY.

0456  REF   1              15,2404  11'403 0           CCS   DNCDUCNT       YES.  ARE WE THRU SENDING CDU'S?
0457                       15,2405  1 2407 1           TCF   +2              NO.
0458  REF   2 LAST 338     15,2406  1 2413 1           TCF   DNCDUEND       YES.

0459  REF   2 LAST 338     15,2407  55'403 0           TS    DNCDUCNT
0460                       15,2410  0 0006 1  FETCHCDU EXTEND
0461  REF   8 LAST 338     15,2411  3 0034 0           DCA   CDUY            PICK UP CDUY AND CDUZ
0462  REF   7 LAST 334     15,2412  1 2140 1           TCF   DNTMEXIT        GO SEND THEM

0465  REF   3 LAST 215     15,2413  3 1346 1  DNCDUEND CA    OLDDVSEL
0466  REF   4 LAST 215     15,2414  55'310 0           TS    DVSELECT

0467  REF   9 LAST 223     15,2415  4 0077 0           CS    DAPBOOLS       RESTORE GODAPGO TO TURN DAP BACK ON.
0468  REF   2 LAST 215     15,2416  7 7751 1           MASK  GODAPGO
0469  REF  10 LAST 338     15,2417  26 077 0           ADS   DAPBOOLS
```

L DOWN-TELEMETRY PROGRAM USER'S OWN PAGE NO. 11 S3 E7

```
0470  REF   1                 15,2420  3 2423 0            CA     LDNFAZE1     REESTABLISH THE NORMAL DOWNLIST.
0471  REF  13 LAST 338        15,2421  55'401 1            TS     DNTMGOTO
0472  REF   1                 15,2422  1 2410 1            TCF    FETCHCDU     SEND THE FINAL CDU PAIR.
0473  REF   3 LAST 330        15,2423    02006 0  LDNFAZE1 ADRES  DNPHASE1
0474  REF   2 LAST 338        15,2424    02365 0  LDNCDUGO ADRES  DNCDUGO
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 1 S3

```
0001                                  15,2425          BANK   15
0002   REF  12 LAST  69                 E5            EBANK= XSM


R0003  CALCGTA COMPUTES THE GYRO TORQUE ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0005  THE INPUT IS THE DESIRED STABLE MEMBER COORDINATES REFERRED TO PRESENT STABLE MEMBER COORDINATES. THE THREE
R0007  HALF-UNIT VECTORS ARE STORED AT XDC, YDC, AND ZDC.

R0008  THE OUTPUTS ARE THE THREE GYRO TORQUING ANGLES TO BE APPLIED TO THE Y, Z, AND X GYROS AND ARE STORED DP AT IGC,
R0010  MGC, AND OGC RESPECTIVELY. ANGLES ARE SCALED PROPERLY FOR IMPULSE.


0011                                  15,2425   71220 1  CALCGTA  ITA     DLOAD          PUSHDOWN  00D,02D,16D,18D,22D=26D,32D=36D
0012   REF  1                         15,2426   00051 0           S2      XDC = (XD1 XD2 XD3)
0013   REF  6 LAST  44                15,2427   02423 0           XDC     YDC = (YD1 YD2 YD3)
0014                                  15,2430   65325 0           PDDL    PDDL           ZDC = (ZD1 ZD2 ZD3)
0015   REF  1                         15,2431   33105 0           ZERODP
0016   REF  7 LAST 340                15,2432   02427 1           XDC +4
0017                                  15,2433   55476 1           DCOMP   VDEF
0018                                  15,2434   77656 1           UNIT
0019   REF  1                         15,2435   14027 1           STODL   ZPRIME         ZP = UNIT(-XD3 0 XD1) = (ZP1 ZP2 ZP3)
0020   REF  2 LAST 340                15,2436   00027 1           ZPRIME

0021                                  15,2437   77742 0           SR1
0022   REF  1                         15,2440   14023 0           STODL   SINTH          SIN(IGC) = ZP1
0023   REF  3 LAST 340                15,2441   00033 1           ZPRIME +4
0024                                  15,2442   77742 0           SR1
0025   REF  1                         15,2443   34021 0           STCALL  COSTH          COS(IGC) = ZP3
0026   REF  1                         15,2444   32476 0           ARCTRIG

0027   REF  1                         15,2445   16503 0           STODL   IGC           Y GYRO TORQUING ANGLE   FRACTION OF REV.
0028   REF  8 LAST 340                15,2446   02425 0           XDC +2
0029                                  15,2447   77742 0           SR1
0030   REF  2 LAST 340                15,2450   14023 0           STODL   SINTH          SIN(MGC) = XD2
0031   REF  4 LAST 340                15,2451   00027 1           ZPRIME

0032                                  15,2452   65205 0           DMP     PDDL
0033   REF  9 LAST 340                15,2453   02427 1           XDC +4          PD00 = (ZP1)(XD3)
0034   REF  5 LAST 340                15,2454   00033 1           ZPRIME +4

0035                                  15,2455   45205 1           DMP     DSU
0036   REF  10 LAST 340               15,2456   02423 0           XDC             MPAC = (ZP3)(XD1)
0037                                  15,2457   77626 0           STADR
0038   REF  2 LAST 340                15,2460   43756 1           STCALL  COSTH          COS(MGC) = MPAC - PD00
0039   REF  2 LAST 340                15,2461   32476 0           ARCTRIG

0040   REF  1                         15,2462   26505 0           STOVL   MGC           Z GYRO TORQUING ANGLE   FRACTION OF REV.
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 2 S3 E5

```
0041  REF   6 LAST 340   15,2463  00027 1          ZPRIME
0042                     15,2464  77641 1   DOT
0043  REF   1            15,2465  02437 0          ZDC
0044  REF   3 LAST 340   15,2466  24021 1   STOVL  COSTH      COS(OGC) = ZP . ZDC
0045  REF   7 LAST 341   15,2467  00027 1          ZPRIME
0046                     15,2470  77641 1   DOT
0047  REF   1            15,2471  02431 0          YDC
0048  REF   3 LAST 340   15,2472  34023 1   STCALL SINTH      SIN(OGC) = ZP . YDC
0049  REF   3 LAST 340   15,2473  32476 0          ARCTRIG

0050  REF   4 LAST 210   15,2474  36501 0   STCALL OGC        X GYRO TORQUING ANGLE   FRACTION OF REV.
0051  REF   2 LAST 340   15,2475  00051 0          S2
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 3 S3 E5

R0052 ARCTRIG COMPUTES AN ANGLE GIVEN THE SINE AND COSINE OF THIS ANGLE.

R0053 THE INPUTS ARE SIN/4 AND COS/4 STORED DP AT SINTH AND COSTH.

R0054 THE OUTPUT IS THE CALCULATED ANGLE BETWEEN +.5 AND -.5 REVOLUTIONS AND STORED AT THETA. THE OUTPUT IS ALSO
R0056 AVAILABLE AT MPAC.

```
0057                        15,2476  51545 1  ARCTRIG  DLOAD   ABS          PUSHDOWN  16D,18D,20D,22D-26D
0058  REF  4 LAST 341       15,2477  00023 0           SINTH
0059                        15,2500  50025 0           DSU      BMN
0060  REF  1                15,2501  33073 0           QTSN45   ABS(SIN/4) - SIN(45)/4
0061  REF  1                15,2502  32511 0           TRIG1    IF (-45,45) OR (135,-135)

0062                        15,2503  72545 0           DLOAD    SL1          (45,135) OR (-135,-45)
0063  REF  4 LAST 341       15,2504  00021 1           COSTH
0064                        15,2505  75326 1           ACOS     SIGN
0065  REF  5 LAST 342       15,2506  00023 0           SINTH
0066  REF  1                15,2507  00025 0           STORE    THETA        X = ARCCOS(COS) WITH SIGN(SIN)
0067                        15,2510  77616 0           RVQ

0068                        15,2511  72545 0  TRIG1    DLOAD    SL1          (-45,45) OR (135,-135)
0069  REF  6 LAST 342       15,2512  00023 0           SINTH
0070                        15,2513  77736 0           ASIN
0071  REF  2 LAST 342       15,2514  14025 0           STODL    THETA        X = ARCSIN(SIN) WITH SIGN(SIN)
0072  REF  5 LAST 342       15,2515  00021 1           COSTH
0073                        15,2516  77640 0           BMN
0074  REF  1                15,2517  32522 0           TRIG2    IF (135,-135)

0075                        15,2520  43545 1           DLOAD    RVQ
0076  REF  3 LAST 342       15,2521  00025 0           THETA    X = ARCSIN(SIN)     (-45,45)

0077                        15,2522  75345 1  TRIG2    DLOAD    SIGN         (135,-135)
0078  REF  1                15,2523  33075 0           HALFDP
0079  REF  7 LAST 342       15,2524  00023 0           SINTH
0080                        15,2525  77625 0           DSU
0081  REF  4 LAST 342       15,2526  00025 0           THETA
0082  REF  5 LAST 342       15,2527  00025 0           STORE    THETA        X = .5 WITH SIGN(SIN) - ARCSIN(SIN)
0083                        15,2530  77616 0           RVQ                            (+) - (+) OR (-) - (-)
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 4 S3 E5

R0084 SMNB TRANSFORMS A STAR DIRECTION FROM STABLE MEMBER TO NAVIGATION BASE COORDINATES.

R0086 THE INPUTS ARE 1) THE STAR VECTOR REFERRED TO PRESENT STABLE MEMBER COORDINATES STORED AT LOCATION 32D OF THE
R0088 VAC AREA. 2) THE GIMBAL ANGLES (CDUY,CDUZ,CDUX) STORED AT ALTERNATING LOCATIONS RESPECTIVELY. THE ANGLES ARE
R0090 USUALLY STORED AT LOCATIONS 2,4, AND 6 OF THE MARK VAC AREA. THEY CAN BE STORED AT LOCATIONS 20,22, AND 24 OF
R0092 YOUR JOB VAC AREA. 3) THE BASE ADDRESS OF THE GIMBAL ANGLES STORED SP AT LOCATION S_1 OF YOUR JOB VAC AREA.

R0094 THE OUTPUT IS THE STAR VECTOR REFERRED TO NAVIGATION BASE COORDINATES STORED AT 32D OF THE VAC AREA. THE OUTPUT
R0096 IS ALSO AVAILABLE AT MPAC.

```
0097                        15,2531  43020 1  SMNB    ITA     CLEAR           PUSHDOWN  00,02,04=10D,30D,32D=36D
0098  REF  3 LAST 341       15,2532  00051 0                  S2
0099  REF  1                15,2533  00264 1                  NBSMBIT         SET NBSMBIT = 0

0100                        15,2534  77170 1  SMNB1   AXT,1   AXT,2           ROTATE X,Z, ABOUT Y
0101                        15,2535  00004 0                  4
0102                        15,2536  00000 1                  0
0103                        15,2537  77624 1          CALL
0104  REF  1                15,2540  32601 1                  AXISROT

0105                        15,2541  77170 1          AXT,1   AXT,2           ROTATE Y,X ABOUT  Z
0106                        15,2542  00002 0                  2
0107                        15,2543  00004 0                  4
0108                        15,2544  77624 1          CALL
0109  REF  2 LAST 343       15,2545  32601 1                  AXISROT

0110                        15,2546  77170 1          AXT,1   AXT,2           ROTATE Z,Y ABOUT  X
0111                        15,2547  00000 1                  0
0112                        15,2550  00002 0                  2
0113                        15,2551  77624 1          CALL
0114  REF  3 LAST 343       15,2552  32601 1                  AXISROT

0115                        15,2553  77650 1          GOTO
0116  REF  4 LAST 343       15,2554  00051 0                  S2
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 5 53 E5

R0117 NBSM TRANSFORMS A STAR DIRECTION FROM NAVIGATION BASE TO STABLE MEMBER COORDINATES.

R0119 THE INPUTS ARE 1) THE STAR VECTOR REFERRED TO NAVIGATION BASE COORDINATES STORED AT LOCATION 32D OF THE VAC
R0121 AREA. 2) THE GIMBAL ANGLES (CDUY,CDUZ,CDUX) STORED AT ALTERNATING LOCATIONS RESPECTIVELY. THE ANGLES ARE
R0123 USUALLY STORED AT LOCATIONS 2,4, AND 6 OF THE MARK VAC AREA. THEY CAN BE STORED AT LOCATIONS 20,22, AND 24 OF
R0125 YOUR JOB VAC AREA. 3) THE BASE ADDRESS OF THE GIMBAL ANGLES STORED SP AT LOCATION S_1 OF YOUR JOB VAC AREA.

R0127 THE OUTPUT IS THE STAR VECTOR REFERRED TO PRESENT STABLE MEMBER COORDINATES STORED AT LOCATION 32D OF THE VAC
R0129 AREA. THE OUTPUT IS ALSO AVAILABLE AT MPAC.

```
0130                        15,2555  43020 1  NBSM    ITA     SET       PUSHDOWN  00,02,04-10D,30D,32D-36D
0131  REF  5 LAST 343       15,2556  00051 0                    S2
0132  REF  2 LAST 343       15,2557  00064 0                    NBSMBIT   SET NBSMBIT = 1

0133                        15,2560  77170 1  NBSM2   AXT,1   AXT,3     ROTATE Z,Y ABOUT  X
0134                        15,2561  00000 1                    0
0135                        15,2562  00002 0                    2
0136                        15,2563  77624 1          CALL
0137  REF  4 LAST 343       15,2564  32601 1                    AXISROT

0138                        15,2565  77170 1          AXT,1   AXT,2     ROTATE Y,X ABOUT  Z
0139                        15,2566  00002 0                    2
0140                        15,2567  00004 0                    4
0141                        15,2570  77624 1          CALL
0142  REF  5 LAST 344       15,2571  32601 1                    AXISROT

0143                        15,2572  77170 1          AXT,1   AXT,2     ROTATE X,Z, ABOUT Y
0144                        15,2573  00004 0                    4
0145                        15,2574  00000 1                    0
0146                        15,2575  77624 1          CALL
0147  REF  6 LAST 344       15,2576  32601 1                    AXISROT

0148                        15,2577  77650 1          GOTO
0149  REF  6 LAST 344       15,2600  00051 0                    S2
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 6 S3 E5

R0150 AXISROT IS UTILIZED BY THE SMNB AND NBSM ROUTINES. SEE REMARKS ON THESE ROUTINES FOR INPUTS AND OUTPUTS.

```
0152                          15,2601  66660 1  AXISROT  XSU,1   SLOAD*
0153  REF  3 LAST 183        15,2602  00050 1            S1                SMNB                .      NBSM
0154                          15,2603  00005 1            4,1     IG    MG    OG    .    OG    MG    IG
0155                          15,2604  56034 0            RTB     XAD,1
0156  REF  3 LAST 184        15,2605  33457 1            CDULOGIC
0157  REF  4 LAST 345        15,2606  00050 1            S1
0158                          15,2607  00037 0            STORE   30D

0159                          15,2610  77746 1  ACCUROT   COS
0160                          15,2611  04011 0            STORE   8D,1                    COS(ANGLE)
01601                         15,2612  73545 1            DLOAD   SIN
0161                          15,2613  00037 0            30D
0163                          15,2614  04013 1            STORE   10D,1                   SIN(ANGLE)

0164                          15,2615  72403 0            DMP*    SL1
0165                          15,2616  77732 1                    32D +4,2
0166                          15,2617  40723 0            PDDL*   DMP*                        PD0
0167                          15,2620  00011 1                    8D,1      S3SIN S1SIN S2SIN  .  S2SIN S1SIN S3SIN
0168                          15,2621  77732 1                    32D +4,2

0169                          15,2622  64752 0            SL1     PDDL*                       PD2
0170                          15,2623  00013 0                    10D,1     S3COS S1COS S2COS  .  S2COS S1COS S3COS

0171                          15,2624  72403 0            DMP*    SL1                         MPAC
0172                          15,2625  00045 0                    32D +4,1  S1SIN S2SIN S3SIN  .  S3SIN S2SIN S1SIN

0173                          15,2626  77614 1            BOFF
0174  REF  3 LAST 344        15,2627  00344 1                    NBSMBIT
0175  REF  1                  15,2630  32643 1                    AXISROT1

0176                          15,2631  45421 1            BDSU    STADR                       .    PD2 - MPAC
0177                          15,2632  67732 0            STORE   32D +4,2                    .  S2    S1    S3
01771                         15,2633  77743 1            DLOAD*
0178                          15,2634  00011 1                    8D,1

0179                          15,2635  72403 0            DMP*    SL1                         .      MPAC
0180                          15,2636  00045 0                    32D +4,1                    .  S3COS S2COS S1COS

0181                          15,2637  45415 0            DAD     STADR                       .    PD0 + MPAC
0182                          15,2640  73732 0            STORE   32D +4,1                    .  S3    S2    S1
01821                         15,2641  43575 1            VLOAD   RVQ
0183                          15,2642  00041 1                    32D
0185                          15,2643  45415 0  AXISROT1  DAD     STADR          MPAC + PD2   .
0186                          15,2644  67732 0            STORE   32D +4,2       S3    S1    S2
01861                         15,2645  77743 1            DLOAD*
0187                          15,2646  00011 1                    8D,1
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 7 S3 E5

```
0188                        15,2647   72403 0          DMP*    SL1             MPAC          .
0189                        15,2650   00045 0                  32D +4,1        S1COS S2COS S3COS .

0190                        15,2651   45425 0          DSJ     STADR           MPAC = PDO    .
0191                        15,2652   73732 0          STORE   32D +4,1        S1    S2    S3
01911                       15,2653   43575 1          VLOAD   RVQ
0192                        15,2654   00041 1                  32D
R0194  CALCGA COMPUTES THE CDU DRIVING ANGLES REQUIRED TO BRING THE STABLE MEMBER INTO THE DESIRED ORIENTATION.

R0196  THE INPUTS ARE  1) THE NAVIGATION BASE COORDINATES REFERRED TO ANY COORDINATE SYSTEM. THE THREE HALF-UNIT
R0198  VECTORS ARE STORED AT XNB,YNB, AND ZNB.  2) THE DESIRED STABLE MEMBER COORDINATES REFERRED TO THE SAME
R0200  COORDINATE SYSTEM ARE STORED AT XSM, YSM, AND ZSM.

R0201  THE OUTPUTS ARE THE THREE CDU DRIVING ANGLES AND ARE STORED SP AT THETAD, THETAD +1, AND THETAD +2.


0203                        15,2655   47375 0  CALCGA  VLOAD   VXV             PUSHDOWN  00-04,16D,18D
0204  REF   1               15,2656   02423 0                  XNB             XNB = OGA (OUTER GIMBAL AXIS)
0205  REF   1               15,2657   02407 0                  YSM             YSM = IGA (INNER GIMBAL AXIS)
0206                        15,2660   41456 0          UNIT    PUSH            PDO = UNIT(OGA X IGA) = MGA

0207                        15,2661   44041 1          DOT     ITA
0208  REF   1               15,2662   02437 0                  ZNB
0209  REF   7 LAST 344      15,2663   00051 0                  S2
0210  REF   6 LAST 342      15,2664   24021 1          STOVL   COSTH           COS(OG) = MGA . ZNB
0211                        15,2665   00001 0                  0
0212                        15,2666   77641 1          DOT
0213  REF   1               15,2667   02431 0                  YNB
0214  REF   8 LAST 342      15,2670   34023 1          STCALL  SINTH           SIN(OG) = MGA . YNB
0215  REF   4 LAST 341      15,2671   32476 0                  ARCTRIG
0216  REF   5 LAST 341      15,2672   26501 1          STOVL   OGC
0217                        15,2673   00001 0                  0

0218                        15,2674   50235 0          VXV     DOT             PROVISION FOR MG ANGLE OF 90 DEGREES
0219  REF   2 LAST 346      15,2675   02423 0                  XNB
0220  REF   2 LAST 346      15,2676   02407 0                  YSM
0221                        15,2677   77752 1          SL1
0222  REF   7 LAST 346      15,2700   24021 1          STOVL   COSTH           COS(MG) = IGA . (MGA X OGA)
0223  REF   3 LAST 346      15,2701   02407 0                  YSM
0224                        15,2702   77641 1          DOT
0225  REF   3 LAST 346      15,2703   02423 0                  XNB
0226  REF   9 LAST 346      15,2704   34023 1          STCALL  SINTH           SIN(MG) = IGA . OGA
0227  REF   5 LAST 346      15,2705   32476 0                  ARCTRIG
0228  REF   2 LAST 340      15,2706   02505 0          STORE   MGC

0229                        15,2707   45246 0          ABS     DSJ
0230  REF   1               15,2710   33113 1                  .166...
0231                        15,2711   77644 1          BPL
0232  REF   1               15,2712   32731 0                  GIMLOCK1        IF ANGLE GREATER THAN 60 DEGREES
```

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```
0233                          15,2713   50375 0  CALCGA1  VLOAD   DOT
0234   REF   1               15,2714   02415 0           ZSM
0235                          15,2715   00001 0           0
0236   REF   8 LAST 346      15,2716   24021 1           STOVL   COSTH        COS(IG) = ZSM . MGA
0237   REF  13 LAST 340      15,2717   02401 0           XSM

0238                          15,2720   45441 1           DOT     STADR
0239   REF  10 LAST 346      15,2721   43754 0           STCALL  SINTH        SIN(IG) = XSM . MGA
0240   REF   6 LAST 346      15,2722   32476 0           ARCTRIG

0241   REF   2 LAST 340      15,2723   26503 0           STOVL   IGC
0242   REF   6 LAST 346      15,2724   02501 1           OGC
0243                          15,2725   77634 0           RTB
0244   REF   1               15,2726   33526 0           V1STO2S
0245   REF   6 LAST 295      15,2727   34401 0           STCALL  THETAD
0246   REF   8 LAST 346      15,2730   00051 0           S2

0247                          15,2731   77776 1  GIMLOCK1 EXIT
02472  REF   3 LAST  90      15,2732   0 6051 0          TC      FLAGUP       SET GIMBAL LOCK FLAG
02474                         15,2733   00200 0           DCT     200
0248   REF  31 LAST 314      15,2734   0 4755 1          TC      ALARM
0249                          15,2735   00401 1           DCT     00401
0250   REF   5 LAST 226      15,2736   0 6112 0          TC      INTPRET
0251                          15,2737   77650 1           GOTO
0252   REF   1               15,2740   32713 0           CALCGA1
```

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R0253 AXISGEN COMPUTES THE COORDINATES OF ONE COORDINATE SYSTEM REFERRED TO ANOTHER COORDINATE SYSTEM.

R0255 THE INPUTS ARE 1) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM A STORED AT STARAD. 2) THE STAR2 VECTOR
R0257 REFERRED TO COORDINATE SYSTEM A STORED AT STARAD +6. 3) THE STAR1 VECTOR REFERRED TO COORDINATE SYSTEM B STORED
R0259 AT LOCATION 6 OF THE VAC AREA. 4) THE STAR2 VECTOR REFERRED TO COORDINATE SYSTEM B STORED AT LOCATION 12D OF
R0261 THE VAC AREA.

R0262 THE OUTPUT DEFINES COORDINATE SYSTEM A REFERRED TO COORDINATE SYSTEM B. THE THREE HALF-UNIT VECTORS ARE STORED
R0264 AT LOCATIONS XDC, XDC +6, XDC +12D, AND STARAD, STARAD +6, STARAD +12D.

```
0265                        15,2741  66370 0  AXISGEN  AXT,1   SSP             PUSHDOWN  00-22D,24D-28D,30D
0266  REF   1              15,2742  02452 0            STARAD +6
0267  REF   5 LAST 345     15,2743  00051 0            S1
0268  REF   2 LAST 348     15,2744  02436 1            STARAD -6

0269                        15,2745  46773 0  AXISGEN1 VLOAD*  VXV*            06D   UA = S1
0270  REF   3 LAST 348     15,2746  02461 0            STARAD +12D,1              STARAD +00D   UB = S1
0271  REF   4 LAST 348     15,2747  02467 0            STARAD +18D,1
0272                        15,2750  77656 1       JNIT                       12D   VA = UNIT(S1 X S2)
0273  REF   5 LAST 348     15,2751  06467 1       STORE  STARAD +18D,1             STARAD +06D   VB = UNIT(S1 X S2)
02731                       15,2752  77773 1       VLOAD*
0274  REF   6 LAST 348     15,2753  02461 0            STARAD +12D,1

0275                        15,2754  76433 1       VXV*   VSL1
0276  REF   7 LAST 348     15,2755  02467 0            STARAD +18D,1    18D   WA = UA X VA
0277  REF   8 LAST 348     15,2756  06475 1       STORE  STARAD +24D,1             STARAD +12D   WB = UB X VB

0278                        15,2757  77700 0       TIX,1
0279  REF   1              15,2760  32745 0            AXISGEN1

0280                        15,2761  66160 0       AXC,1  SXA,1
0281                        15,2762  00006 1            6
0282                        15,2763  00036 1            30D

0283                        15,2764  66370 0       AXT,1  SSP
0284                        15,2765  00022 1            18D
0285  REF   6 LAST 348     15,2766  00051 0            S1
0286                        15,2767  00006 1            6

0287                        15,2770  66374 1       AXT,2  SSP
0288                        15,2771  00006 1            6
0289  REF   9 LAST 347     15,2772  00052 0            S2
0290                        15,2773  00002 0            2

0291                        15,2774  76720 0  AXISGEN2 XCHX,1  VLOAD*
0292                        15,2775  00036 1            30D              X1=-6 X2=+6   X1=-6 X2=+4   X1=-6 X2=+2
0293                        15,2776  00001 0            0,1
0294                        15,2777  62757 0       VXSC*  PDVL*           J=(UA)(UB1)   J=(UA)(UB2)   J=(UA)(UB3)
```

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```
0295  REF   9 LAST 348   15,3000  75324 0                 STARAD +6,2
0296                     15,3001  00007 0                 6,1
0297                     15,3002  77757 1          VXSC*
0298  REF  10 LAST 349   15,3003  75316 1                 STARAD +12D,2
0299                     15,3004  30031 0          STOVL* 24D              K=(VA)(VB1)   J=(VA)(VB2)   J=(VA)(VB3)
0300                     15,3005  00015 0                 12D,1

0301                     15,3006  53357 0          VXSC*  VAD
0302  REF  11 LAST 349   15,3007  75310 1                 STARAD +18D,2  L=(WA)(WB1)   J=(WA)(WB2)   J=(WA)(WB3)
0303                     15,3010  76455 1          VAD    VSL1
0304                     15,3011  00031 0                 24D
0305                     15,3012  77720 1          XCHX,1
0306                     15,3013  00036 1                 30D
0307  REF  11 LAST 340   15,3014  06445 1          STORE  XDC +18D,1      XDC = L+J+K   YDC = L+J+K   ZDC = L+J+K

0308                     15,3015  77700 0          TIX,1
0309  REF   1            15,3016  33017 1                 AXISGEN3

0310                     15,3017  77704 1  AXISGEN3 TIX,2
0311  REF   1            15,3020  32774 1                 AXISGEN2

0312                     15,3021  77775 1          VLOAD
0313  REF  12 LAST 349   15,3022  02423 0                 XDC
0314  REF  12 LAST 349   15,3023  26445 0          STOVL  STARAD
0315  REF   2 LAST 341   15,3024  02431 0                 YDC
0316  REF  13 LAST 349   15,3025  26453 1          STOVL  STARAD +6
0317  REF   2 LAST 341   15,3026  02437 0                 ZDC
0318  REF  14 LAST 349   15,3027  02461 0          STORE  STARAD +12D

0319                     15,3030  77616 0          RVQ
```

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R0418 TRANSPSE COMPUTES THE TRANSPOSE OF A MATRIX (TRANSPOSE = INVERSE OF ORTHOGONAL TRANSFORMATION).

R0420 THE INPUT IS A MATRIX DEFINING COORDINATE SYSTEM A WITH RESPECT TO COORDINATE SYSTEM B STORED IN STARAD THRU
R0422 STARAD +17D.

R0423 THE OUTPUT IS A MATRIX DEFINING COORDINATE SYSTEM B WITH RESPECT TO COORDINATE SYSTEM A STORED IN STARAD THRU
R0425 STARAD +17D.

```
0426  REF  15 LAST 349   15,3031  53'447 0  TRANSPSE DXCH   STARAD +2        PUSHDOWN  NONE
0427  REF  16 LAST 350   15,3032  53'453 0            DXCH   STARAD +6
0428  REF  17 LAST 350   15,3033  53'447 0            DXCH   STARAD +2

0429  REF  18 LAST 350   15,3034  53'451 1            DXCH   STARAD +4
0430  REF  19 LAST 350   15,3035  53'461 1            DXCH   STARAD +12D
0431  REF  20 LAST 350   15,3036  53'451 1            DXCH   STARAD +4

0432  REF  21 LAST 350   15,3037  53'457 1            DXCH   STARAD +10D
0433  REF  22 LAST 350   15,3040  53'463 0            DXCH   STARAD +14D
0434  REF  23 LAST 350   15,3041  53'457 1            DXCH   STARAD +10D
0435  REF   1            15,3042  1 6125 0            TCF    DANZIG
```

R0436 SMD/EREF TRANSFORMS STABLE MEMBER DESIRED COORDINATES FROM STABLE MEMBER DESIRED (DESIRED = PRESENT HERE) TO
R0438 EARTH REFERENCE COORDINATES TO ALIGN THE STABLE MEMBER TO SPECIFIED GIMBAL ANGLES.

R0440 THE INPUTS ARE 1) THE MATRIX DEFINING THE EARTH REFERENCE COORDINATE FRAME WITH RESPECT TO THE NAVIGATION BASE
R0442 COORDINATE FRAME, 2) SAME AS 2) AND 3) OF SMNB.

R0443 THE OUTPUT IS THE DESIRED STABLE MEMBER COORDINATES WITH RESPECT TO THE EARTH REFERENCE COORDINATE FRAME. THE
R0445 THREE UNIT VECTORS ARE STORED AT XSM, YSM, AND ZSM.

```
0446                      15,3043   77220 1  SMD/EREF ITA    VLOAD          PUSHDOWN  00,02,04=10D,30D,32D=36D
0447                      15,3044   00014 1                   12D
0448  REF   1             15,3045   33103 0                   XUNIT
0449                      15,3046   34041 0            STCALL 32D
0450  REF   3 LAST 183    15,3047   32531 1                   SMNB           STABLE MEMBER TO NAVIGATION BASE
0451                      15,3050   76521 0            MXV    VSL1
0452  REF  24 LAST 350    15,3051   02445 0                   STARAD         THEN TO EARTH REFERENCE
0453  REF  14 LAST 347    15,3052   26401 0            STOVL  XSM
0454  REF   1             15,3053   33101 1                   YUNIT

0455                      15,3054   34041 0            STCALL 32D
0456  REF   4 LAST 350    15,3055   32531 1                   SMNB           STABLE MEMBER TO NAVIGATION BASE
0457                      15,3056   76521 0            MXV    VSL1
0458  REF  25 LAST 350    15,3057   02445 0                   STARAD         THEN TO EARTH REFERENCE
0459  REF   4 LAST 346    15,3060   26407 0            STOVL  YSM
0460  REF   1             15,3061   33077 1                   ZUNIT

0461                      15,3062   34041 0            STCALL 32D
```

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```
0462  REF  5 LAST 350   15,3063  32531 1                    SMNB     STABLE MEMBER TO NAVIGATION BASE
0463                    15,3064  76521 0            MXV     VSL1
0464  REF 26 LAST 350   15,3065  02445 0                    STARAD   THEN TO EARTH REFERENCE
0465  REF  2 LAST 347   15,3066  36415 1            STCALL  ZSM
0466                    15,3067  00014 1                    12D

0467                    15,3070  67777 1  270DEG    2DEC    -.25
C0467                   15,3071  77777 0
0468                    15,3072  05520 0  QTSN45    2DEC    .176a
C0468                   15,3073  26075 1
0469                    15,3074  20000 0  HALFDP    2DEC    .5
C0469                   15,3075  00000 1
0470                    15,3076  00000 1  ZJNIT     2DEC    0
C0470                   15,3077  00000 1
0471                    15,3100  00000 1  YJNIT     2DEC    0
C0471                   15,3101  00000 1
0472                    15,3102  20000 0  XJNIT     2DEC    0.5
C0472                   15,3103  00000 1
0473                    15,3104  00000 1  ZERODP    2DEC    0
C0473                   15,3105  00000 1
0474                    15,3106  00000 1            2DEC    0
C0474                   15,3107  00000 1
0475                    15,3110  00000 1            2DEC    0
C0475                   15,3111  00000 1
0476                    15,3112  05252 1  .166...   2DEC    .1666666667
C0476                   15,3113  25253 1
```

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```
P0477   AOTNB CONVERTS THE AOT RETICLE ROTATION ANGLE (YROT AND SROT) AND
R0478   THE DETENT SETTING TO A HALF UNIT STAR VECTOR REFERRED TO THE
R0479   NAVIGATION BASE FOR NON-FLIGHT ALIGNMENT MODES
R0480
R0481   THE INPUTS ARE
R0482
R0483      Y RET. LINE RATATION S(YROT) STORED IN LOC 3 OF THE MARK VAC AREA
R0484      SPIRAL ROTATION ANGLE S(SROT) STORED IN LOC 5 OF MARK VAC AREA
R0485      ANGLE OF CENTER OF FIELD OF VIEW S(ELV) STORED IN LOC 9 OF MARK VAC
R0486      AOT ASZIMUTH ANGLE S(DET) STORED IN LOC 8 OF MARK VAC AREA
R0487      THE COMPLEMENT OF BASE ADDRESS OF MARK VAC IS STORED AT X1
R04871     COMPENSATION FOR FIELD OF VIEW TILT IN LOC 100
R04872  THE ABOVE STORAGE IS DONE BY AOTMARK

R0488
R0489   THE OUTPUT IS A HALF UNIT STAR VECTOR IN NB COORDINATES STORED
R0490   AT 320 AND AVAILABLE IN VAC ON RETURN TO THE CALLING PROGRAM.
R0491
 0492                        15,3114  66601 0  AOTNB   SETPD  SLOAD*
 0493                        15,3115  00001 0           0
 04931                       15,3116  00013 0           100,1          AOT FOV TILT COMPENSATION ANGLE
 04932                       15,3117  41542 1  SR1      PUSH           RESCALE TILT TO 2PI
 0494                        15,3120  47133 0  SLOAD*   RTB
 0495                        15,3121  00004 0           3,1
 0496  REF  4 LAST 345       15,3122  33457 1           CDULOGIC
 0497                        15,3123  00017 1  STORE    140            STORE UNCOMPENSATED YROT FOR S COMP
 04971                       15,3124  41415 1  DAD      PUSH           YROT NOW CORRECTED FOR TILT
 0498                        15,3125  65346 0  COS      PDDL           1/2 COS(YROT) PD 0-1
 0499                        15,3126  41556 1  SIN      PUSH           1/2 SIN(YROT) PD 2-3
 0500                        15,3127  47133 0  SLOAD*   RTB
 0501                        15,3130  00006 1           5,1
 0502  REF  5 LAST 352       15,3131  33457 1           CDULOGIC
 0503                        15,3132  00021 1  STORE    160            STORE S IF S AND Y ARE ZERO, S=0
 0504                        15,3133  52054 1  BZE      GOTO           S NOT ZERO
 0505  REF  1                15,3134  33136 0           SISZ           S=0
 0506  REF  1                15,3135  33146 1           SCOMP
 0507                        15,3136  53145 1  SISZ     DLOAD  BZE     IS Y ZERO
 0508                        15,3137  00017 1           140
 0509  REF  1                15,3140  33143 1           YISZ           Y=0
 0510                        15,3141  77650 1  GOTO
 0511  REF  2 LAST 352       15,3142  33146 1           SCOMP
 0512                        15,3143  52145 0  YISZ     DLOAD  GOTO
 0513  REF  2 LAST 340       15,3144  33105 0           ZEROP
 0514  REF  1                15,3145  33153 0           SGOT
 0515                        15,3146  45345 1  SCOMP    DLOAD  DSU
 0516                        15,3147  00017 1           140
 0517                        15,3150  00021 1           160            Y-S
 0518                        15,3151  77621 1  BDSU
 0519  REF  1                15,3152  33240 1           NEARONE        S=360-(Y-S)
 0520                        15,3153  41405 0  SGOT     DMP    PUSH
```

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```
0521  REF  1              15,3154  33236 0              DP1/12
0522                      15,3155  65346 0        COS   PDDL
0523                      15,3156  41556 1        SIN   PUSH
0524                      15,3157  72405 0        DMP   SL1
0525                      15,3160  00001 0              0
0526                      15,3161  14001 0        STODL 0

0527                      15,3162  00003 1              2
0528                      15,3163  45405 1        DMP   STADR
0529                      15,3164  77774 0        STORE 2

0530                      15,3165  47133 0        SLOAD* RTB
0531                      15,3166  00012 1              9D,1
0532  REF  6 LAST 352     15,3167  33457 1              CDULOGIC
0533                      15,3170  73406 1        PUSH  SIN
0534                      15,3171  71525 0        PDDL  COS
0535                      15,3172  41206 0        PUSH  DMP
0536                      15,3173  00001 0              0
0537                      15,3174  41325 0        PDDL  DMP
0538                      15,3175  00005 1              4
0539                      15,3176  00007 0              6
0540                      15,3177  72415 1        DAD   SL1
0541                      15,3200  77626 0        STADR
0542                      15,3201  63736 0        STODL 32D

0543                      15,3202  77605 1        DMP
0544                      15,3203  00005 1              4
0545                      15,3204  14005 1        STODL 4

0546                      15,3205  44205 0        DMP   BDSU
0547                      15,3206  00001 0              0
0548                      15,3207  66606 1        PUSH  SLOAD*
0549                      15,3210  00011 1              8D,1
0550                      15,3211  41434 1        RTB   PUSH
0551  REF  7 LAST 353     15,3212  33457 1              CDULOGIC
0552                      15,3213  65346 0        COS   PDDL
0553                      15,3214  77756 0        SIN
0554                      15,3215  00001 0        STORE 0

0555                      15,3216  65205 0        DMP   PDDL
0556                      15,3217  00005 1              4
0557                      15,3220  00007 0              6
0558                      15,3221  43205 1        DMP   DAD
0559                      15,3222  00003 1              2
0560                      15,3223  77712 0        SL2
0561                      15,3224  14043 0        STODL 34D

0562                      15,3225  45405 1        DMP   STADR
0563                      15,3226  63732 1        STODL 36D
```

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```
 0564                15,3227   77605 1            )MP
 0565                15,3230   62421 1            3DSU    SL2
 0566                15,3231   00045 0                    36D
 0567                15,3232   24045 0            STOVL   36D
 0568                15,3233   00041 1                    32D
 0569                15,3234   77616 0            RVQ

 0570                15,3235   02525 1  D?1/12    2DEC    .0833333333        : :
C0570                15,3236   12525 0
 0571                15,3237   37777 1  NEARONE   2DEC    .999999999
C0571                15,3240   37777 1
```

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```
P0572   AOTSM CALCULATES A HALF UNIT STAR VECTOR IN STABLE MEMBER COORDINATES
R0573   FROM TWO PLANES CONTAINING THE STAR REFERRED TO N3
R0574
R0575   THE INPUTS ARE
R0576
R0577     AOT AZIMUTH AND ELEVATION STORED IN 8D AND 9D RESP. OF VAC AREA
R0578     CDUY, CDUZ AND CDUX FROM A YMARK STORED AT 3, 5, AND 7 OF VAC AREA
R0579     CDUY, CDUZ AND CDUX FROM A XMARK STORED AT 2, 4, AND 6 OF VAC AREA
R0579-1   COMPENSATION FOR FIELD OF VIEW STORED AT 10D OF VAC AREA
R0580   THE BASE ADDRESS OF THE CDUS IS STORED AT LOCATION S1
R0581
R0582   THE OUTPUT IS A STAR VECTOR REFERRED TO STABLE MEMBER AT LOC 32D
R0583   AND AVAILBLE IN MPAC
R0584
 0585                  15,3241  40220 0  AOTSM   STQ     SETPD
 0586                  15,3242  00035 1           29D                 SET UP RETURN
 0587                  15,3243  00001 0           0
 0588                  15,3244  66740 1           LXC,1   SLOAD*
 0589  REF  7 LAST 348 15,3245  00050 1           S1                  COMPLEMENT OF CDU ADR FOR XMARK
 0590                  15,3246  00011 1           8D,1                LOAD APPARENT TILT ANGLE,ONES COMP
 0590-1                15,3247  77742 0           SR1                 RESCALE TILT TO 2PI
 0591                  15,3250  71406 0           PUSH    COS
 0592                  15,3251  73525 1           PDDL    SIN         1/2 COS(TA)  0-1
 0593                  15,3252  66606 1           PUSH    SLOAD*      1/2 SIN(TA)  2-3
 0594                  15,3253  00007 0                   6,1         LOAD AZIMUTH, 2S COMP
 0595                  15,3254  41434 1           RTB     PUSH
 0596  REF  8 LAST 353 15,3255  33457 1                   CDULOGIC
 0597                  15,3256  65346 0           COS     PDDL        1/2 COS(AZ)  4-5
 0598                  15,3257  41556 1           SIN     PUSH        1/2 SIN(AZ)  6-7
 0599                  15,3260  65205 0           DMP     PDDL
 0600                  15,3261  00001 0                   0
 0601                  15,3262  65205 0           DMP     PDDL
 0602                  15,3263  00003 1                   2
 0603                  15,3264  00005 1                   4
 0604                  15,3265  65205 0           DMP     PDDL
 0605                  15,3266  00001 0                   0
 0606                  15,3267  00005 1                   4
 0607                  15,3270  41405 0           DMP     PUSH
 0608                  15,3271  47133 0           SLOAD*  RTB
 0609                  15,3272  00010 0                   7,1         LOAD ELEVATION, 2S COMP
 0610  REF  9 LAST 355 15,3273  33457 1                   CDULOGIC
 0611                  15,3274  73406 1           PUSH    SIN
 0612                  15,3275  71525 0           PDDL    COS         1/2 SIN(ELV)  14-15
 0613                  15,3276  41206 0           PUSH    DMP         1/2 COS(ELV)  16-17
 0614                  15,3277  00001 0                   0
 0615                  15,3300  77752 1           SL1
 0616                  15,3301  14041 1           STODL   32D         X COMPONENT OF X-PLANE VECTOR

 0617                  15,3302  72405 0           DMP     SL1         UP 16-17
 0618                  15,3303  00003 1                   2
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 17 S3 E5

```
0619                    15,3304  65276 1        DCOMP   PDDL      X COMPONENT OF Y-PLANE VECTOR 15-17

0620                    15,3305  00017 1                14D
06201                   15,3306  72405 0        DMP     SL1
0621                    15,3307  00007 0                6
0622                    15,3310  72421 0        BDSU    SL1
0623                    15,3311  00015 0                12D
0624                    15,3312  14043 0        STODL   34D       Y COMPONENT OF X-PLANE VEC

0625                    15,3313  00017 1                14D
0626                    15,3314  72405 0        DMP     SL1
0627                    15,3315  00013 0                10D
0628                    15,3316  72415 1        DAD     SL1
0629                    15,3317  00011 1                8D
0630                    15,3320  77676 0        DCOMP
0631                    15,3321  14045 0        STODL   36D       Z COMPONENT OF X-PLANE VECTOR

0632                    15,3322  00017 1                14D
0633                    15,3323  72405 0        DMP     SL1
0634                    15,3324  00011 1                8D
0635                    15,3325  72415 1        DAD     SL1
0636                    15,3326  00013 0                10D
0637                    15,3327  41325 0        PDDL    DMP       Y COMPONENT OF Y-PLANE VECTOR 18-19

0638                    15,3330  00017 1                14D
0639                    15,3331  00015 0                12D
0640                    15,3332  72425 1        DSU     SL1
0641                    15,3333  00007 0                6
0642                    15,3334  34025 1        STCALL  20D       Z COMPONENT OF Y-PLANE VECTOR 20-21

0643  REF  1            15,3335  32555 0                NBSM      TRANSFORM TO SM
0644                    15,3336  24013 0        STOVL   10D       STORE X-PLAVE VECTOR (SM)

0645                    15,3337  00021 1                16D       LOAD Y-PLANE VECTOR (NB)
0646                    15,3340  62120 0        XCHX,1  INCR,1
0647  REF  8 LAST 355   15,3341  00050 1                S1        INCREMENT CDU BASE ADR TO YMARK CDUS
06471                   15,3342  00001 0                1
06472                   15,3343  77720 1        XCHX,1             PUT IT BACK IN S1
06473  REF  9 LAST 356  15,3344  00050 1                S1
06474                   15,3345  34041 0        STCALL  32D
06475  REF  2 LAST 356  15,3346  32555 0                NBSM      GET Y-PLANE IN SM
06476                   15,3347  76435 1        VXV     VSL1      YP CROSS XP
06477                   15,3350  00013 0                10D
06478                   15,3351  53476 1        VCOMP   UNIT      UNIT(XP CROSS YP)
06479                   15,3352  00041 1        STORE   32D       STAR VECTOR IN SM COORDINATES
0648                    15,3353  77650 1        GOTO
06481                   15,3354  00035 1                29D       RETURN
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 18 S3 E5

```
P0649           THE FOLLOWING ROUTINE TAKES A HALF UNIT TARGET VECTOR REFERRED TO NAV BASE COORDINATES AND FINDS BOTH
R0651   GIMBAL ORIENTATIONS AT WHICH THE RR MIGHT SIGHT THE TARGET. THE GIMBAL ANGLES CORRESPONDING TO THE PRESENT MODE
R0653   ARE LEFT IN MODEA AND THOSE WHICH WOULD BE USED AFTER A REMODE IN MODEB. THIS ROUTINE ASSUMES MODE 1 IS TRUNNION
R0655   ANGLE LESS THAN 90 DEGS IN ABS VALUE WITH ARBITRARY SHAFT, WITH A CORRESPONDING DEFINITION FOR MODE 2. MODE
R0657   SELECTION AND LIMIT CHECKING ARE DONE ELSEWHERE.

R0658           THE MODE 1 CONFIGURATION IS CALCULATED FROM THE VECTOR AND THEN MODE 2 IS FOUND USING THE RELATIONS

R0660           S(2) = 180 + S(1)
R0661           T(2) = 180 - T(1)

 0662                          15,3355  57545 1  RRANGLES DLOAD   DCOMP          SINCE WE WILL FIND THE MODE 1 SHAFT
 0663                          15,3356  00043 0           34D                    ANGLE LATER, WE CAN FIND THE MODE 1
 0664                          15,3357  67401 0           SETPD   ASIN           TRUNNION BY SIMPLY TAKING THE ARCSIN OF
 0665                          15,3360  00001 0                   0              THE Y COMPONENT, THE ASIN GIVING AN
 0666                          15,3361  44206 0           PUSH    BDSU           ANSWER WHOSE ABS VAL IS LESS THAN 90 DEG
 0667   REF  2 LAST 342        15,3362  33075 0                   HALFDP
 0668                          15,3363  14005 1           STODL   4              MODE 2 TRUNNION TO 4.

 0669   REF  3 LAST 352        15,3364  33105 0                   ZERODP
 0670                          15,3365  24043 0           STOVL   34D            UNIT THE PROJECTION OF THE VECTOR IN THE
 0671                          15,3366  00041 1                   32D            X-Z PLANE.
 0672                          15,3367  41056 1           UNIT    BOVB           CALL FOR S/C MANEUVER ON GIMBAL LOCK.
 0673   REF  4 LAST 181        15,3370  20347 0                   DESRETRN +1
 0674                          15,3371  14041 1           STODL   32D            PROJECTION VECTOR.
 0675                          15,3372  00041 1                   32D
 0676                          15,3373  44142 0           SR1     STQ
 0677   REF 10 LAST 348        15,3374  00051 0                   S2
 0678   REF 11 LAST 347        15,3375  14023 0           STODL   SINTH          USE ARCTRIG SINCE SHAFT COULD BE ARB.
 0679                          15,3376  00045 0                   36D
 0680                          15,3377  77742 0           SR1
 0681   REF  9 LAST 347        15,3400  34021 0           STCALL  COSTH
 0682   REF  7 LAST 347        15,3401  32476 0                   ARCTRIG
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 19 S3 E5

```
0683                          15,3402   43206 1     DUSH    DAD       MODE 1 SHAFT TO 2.
0684  REF   3 LAST 357       15,3403   33075 0             HALFNP    (OVERFLOW DOESNT MATTER SINCE SCALED REV
0685                          15,3404   24007 0     STOVL   6
0686                          15,3405   00005 1             4
0687                          15,3406   77634 0     RTB               FIND MODE 2 CDU ANGLES.
0688  REF   1                 15,3407   33543 0             2V1STO2S
0689  REF   3 LAST 180       15,3410   24425 1     STOVL   MODEB
0690                          15,3411   00001 0             0
0691                          15,3412   77634 0     RTB               MODE 1 ANGLES TO MODE A.
0692  REF   2 LAST 358       15,3413   33543 0             2V1STO2S
0693  REF   2 LAST 178       15,3414   00423 1     STORE   MODEA
0694                          15,3415   77776 1     EXIT

0695  REF  76 LAST 311       15,3416   4 0412 1    CS      RADMODES  SWAP MODEA AND MODEB IF RR IN MODE 2.
0696  REF  20 LAST 315       15,3417   7 7750 0    MASK    BIT12
0697  REF 134 LAST 338       15,3420   10 000 0    CCS     A
0698                          15,3421   1 3425 0    TCF     +4

0699  REF   3 LAST 358       15,3422   52 423 0    DXCH    MODEA
0700  REF   4 LAST 358       15,3423   52 425 0    DXCH    MODEB
0701  REF   4 LAST 358       15,3424   52 423 0    DXCH    MODEA

0702  REF   6 LAST 347       15,3425   0 6112 0    TC      INTPRET
0703                          15,3426    77650 1    GOTO
0704  REF  11 LAST 357       15,3427    00051 0            S2
```

L INFLIGHT ALIGNMENT ROUTINES USER'S OWN PAGE NO. 20 S3 E5

```
P0705     GIVEN RR TRUNION AND SHAFT (T,S) IN TANG,+1, FIND THE ASSOCIATED
R0706  LINE OF SIGHT IN NAV BASE AXES.  THE HALF UNIT VECTOR, .5(SIN(S)COS(T),
R0707  -SIN(T),COS(S)COS(T)) IS LEFT IN MPAC AND 32D.

0708                    15,3430  47135 0  RRNB    SLOAD   RTB
0709  REF  16 LAST 296  15,3431  00423 1           TANG
07091 REF  10 LAST 355  15,3432  33457 1           CDULOGIC
0710                    15,3433  41401 1  SETPD   PUSH    TRUNNION ANGLE TO 0
0711                    15,3434  00001 0           0
0712                    15,3435  57556 0  SIN     DCOMP
0713                    15,3436  14043 0  STODL   34D     Y COMPONENT

0714                    15,3437  41546 0  COS     PUSH    .5 COS(T) TO 0
0715                    15,3440  47135 0  SLOAD   RTB
0716  REF  17 LAST 359  15,3441  00424 0           TANG +1
0717  REF  11 LAST 359  15,3442  33457 1           CDULOGIC
0718                    15,3443  71406 0  PUSH    COS     SHAFT ANGLE TO 2
0719                    15,3444  72405 0  DMP     SL1
0720                    15,3445  00001 0           0
0721                    15,3446  14045 0  STODL   36D     Z COMPONENT

0722                    15,3447  41356 1  SIN     DMP
0723                    15,3450  77752 1  SL1
0724                    15,3451  24041 1  STOVL   32D
0725                    15,3452  00041 1           32D
0726                    15,3453  77616 0  RVQ
```

L RTB OP CODES USER'S OWN PAGE NO. 1 S3

```
 0001                                15,3454          BANK   15
R0002          LOAD TIME2, TIME1 INTO MPAC:

 0003                        15,3454  0 0006 1  LDATIME EXTEND
 0004  REF  15 LAST 334      15,3455  3 0025 0          DCA    TIME2
 0005  REF   1               15,3456  1 6542 0          TCF    SLOAD2

R0006          CONVERT THE SINGLE PRECISION 2'S COMPLEMENT NUMBER ARRIVING IN MPAC (SCALED IN HALF-REVOLUTIONS) TO A
R0008  DP 1'S COMPLEMENT NUMBER SCALED IN REVOLUTIONS.

 0009  REF 135 LAST 327      15,3457  10 144 1  COULOGIC CCS    MPAC
 0010  REF 130 LAST 331      15,3460  3 7767 0          CAF    ZERO
 0011                        15,3461  1 3464 0          TCF    +3
 0012                        15,3462  1 3463 1          NOOP
 0013  REF   2 LAST 173      15,3463  4 7746 1          CS     HALF

 0014  REF 136 LAST 360      15,3464  54 145 0          TS     MPAC +1
 0015  REF 131 LAST 360      15,3465  3 7767 0          CAF    ZERO
 0016  REF 137 LAST 360      15,3466  56 144 0          XCH    MPAC
 0017                        15,3467  0 0006 1          EXTEND
 0018  REF   3 LAST 360      15,3470  7 7746 1          MP     HALF
 0019  REF 138 LAST 360      15,3471  20 145 0          DAS    MPAC
 0020  REF   2 LAST 360      15,3472  1 6544 0          TCF    SLOAD2 +2        C(A) = +0.

R0021          READ IMU CDUS INTO MPAC AS A VECTOR. ESPECIALLY USEFUL IN CONNECTION WITH SMNB, ETC.

 0023                        15,3473  0 0004 0  READCDUS INHINT
 0024  REF   9 LAST 338      15,3474  3 0033 1          CA     CDUY             IN ORDER Y Z X
 0025  REF 139 LAST 360      15,3475  54 144 1          TS     MPAC
 0026  REF   7 LAST 223      15,3476  3 0034 0          CA     CDUZ
 0027  REF 200 LAST 360      15,3477  54 147 1          TS     MPAC +3
 0028  REF  11 LAST 336      15,3500  3 0032 0          CA     CDUX
 0029  REF   1               15,3501  1 3510 1          TCF    READPIPS +6      COMMON CODING.

R0030          READ THE PIPS INTO MPAC WITHOUT CHANGING THEM:

 0031                        15,3502  0 0004 0  READPIPS INHINT
 0032  REF   4 LAST 336      15,3503  3 0037 0          CA     PIPAX
 0033  REF 201 LAST 360      15,3504  54 144 1          TS     MPAC
 0034  REF   2 LAST 147      15,3505  3 0040 0          CA     PIPAY
 0035  REF 202 LAST 360      15,3506  54 147 1          TS     MPAC +3
 0036  REF   3 LAST 336      15,3507  3 0041 1          CA     PIPAZ
 0037                        15,3510  0 0003 1          RELINT
 0038  REF 203 LAST 360      15,3511  54 151 0          TS     MPAC +5

 0039  REF 132 LAST 360      15,3512  3 7767 0          CAF    ZERO
 0040  REF 204 LAST 360      15,3513  54 145 0          TS     MPAC +1
 0041  REF 205 LAST 360      15,3514  54 150 1          TS     MPAC +4
 0042  REF 206 LAST 360      15,3515  54 152 0          TS     MPAC +6
```

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```
0043   REF  36 LAST 338     15,3516  4 7763 0  VECMODE  CS    ONE
0044   REF   1             15,3517  1 6124 1           TCF   NEWMODE

R0045          FORCE TP SIGN AGREEMENT IN MPAC:

0046   REF   6 LAST 327     15,3520  0 7327 0  SGNAGREE TC    TPAGREE
0047   REF   2 LAST 350     15,3521  1 6125 0           TCF   DANZIG

R0048          CONVERT THE DP 1'S COMPLEMENT ANGLE SCALED IN REVOLUTIONS TO A SINGLE PRECISION 2'S COMPLEMENT ANGLE
R0050  SCALED IN HALF-REVOLUTIONS.

0051   REF   1             15,3522  0 3552 0  1STO2S   TC    1TO2SUB
0052   REF 103 LAST 360    15,3523  3 7767 0           CAF   ZERO
0053   REF 207 LAST 360    15,3524  54 145 0           TS    MPAC +1
0054   REF   2 LAST 361    15,3525  1 6124 1           TCF   NEWMODE

R0055          DO 1STO2S ON A VECTOR OF ANGLES:

0056   REF   2 LAST 361    15,3526  0 3552 0  V1STO2S  TC    1TO2SUB        ANSWER ARRIVES IN A AND MPAC.

0057   REF 208 LAST 361    15,3527  52 152 0           DXCH  MPAC +5
0058   REF 209 LAST 361    15,3530  52 145 0           DXCH  MPAC
0059   REF   3 LAST 361    15,3531  0 3552 0           TC    1TO2SUB
0060   REF 210 LAST 361    15,3532  54 146 0           TS    MPAC +2

0061   REF 211 LAST 361    15,3533  52 150 1           DXCH  MPAC +3
0062   REF 212 LAST 361    15,3534  52 145 0           DXCH  MPAC
0063   REF   4 LAST 361    15,3535  0 3552 0           TC    1TO2SUB
0064   REF 213 LAST 361    15,3536  54 145 0           TS    MPAC +1

0065   REF 214 LAST 361    15,3537  3 0151 1           CA    MPAC +5
0066   REF 215 LAST 361    15,3540  54 144 1           TS    MPAC

0067   REF  37 LAST 361    15,3541  3 7763 1  TPMODE   CAF   ONE            MODE IS TP.
0068   REF   3 LAST 361    15,3542  1 6124 1           TCF   NEWMODE

R0069          V1STO2S FOR 2 COMPONENT VECTOR. USED BY RR.

0070   REF   5 LAST 361    15,3543  0 3552 0  2V1STO2S TC    1TO2SUB
0071   REF 216 LAST 361    15,3544  52 150 1           DXCH  MPAC +3
0072   REF 217 LAST 361    15,3545  52 145 0           DXCH  MPAC
0073   REF   6 LAST 361    15,3546  0 3552 0           TC    1TO2SUB
0074   REF  75 LAST 333    15,3547  54 001 1           TS    L
0075   REF 218 LAST 361    15,3550  3 0147 0           CA    MPAC +3
0076   REF   3 LAST 360    15,3551  1 6542 0           TCF   SLOAN2

R0077          SUBROUTINE TO DO DOUBLING AND 1'S TO 2'S CONVERSION:

0078   REF 219 LAST 361    15,3552  52 145 0  1TO2SUB  DXCH  MPAC           FINAL MPAC +1 UNSPECIFIED.
0079                       15,3553  20 001 1           DDOUBL
```

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```
0080  REF 135 LAST 358   15,3554  10 000 0   CCS   A
0081  REF  88 LAST 361   15,3555  6 7763 1   AD    ONE
0082                     15,3556  1 3560 0   TCF   +2
0083                     15,3557  4 0000 0   COM                THIS WAS REVERSE OF MSU.

0084  REF 220 LAST 361   15,3560  54 144 1   TS    MPAC         AND SKIP ON OVERFLOW.
0085  REF 159 LAST 327   15,3561  0 0002 0   TC    Q

0086  REF 136 LAST 362   15,3562  50 000 1   INDEX A            OVERFLOW UNCORRECT AND IN MSU.
0087  REF   1            15,3563  3 7744 1   CAF   LIMITS
0088  REF 221 LAST 362   15,3564  26 144 1   ADS   MPAC
0089  REF 160 LAST 362   15,3565  0 0002 0   TC    Q
```

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```
P0090           SUBROUTINE TO INCREMENT CDUS
 0091  REF   1                15,3566  3 3601 0  INCRCDUS CAF   LOCTHETA
 0092  REF  15 LAST 259       15,3567  54 120 0           TS    BUF          PLACE ADRES(THETA) IN BUF.
 0093  REF 222 LAST 362       15,3570  30 144 0           CAE   MPAC         INCREMENT IN 1S COMPL.
 0094  REF   2 LAST 205       15,3571  0 3602 0           TC    CDUINC

 0095  REF  16 LAST 363       15,3572  24 120 1           INCR  BUF
 0096  REF 223 LAST 363       15,3573  30 147 0           CAE   MPAC +3
 0097  REF   3 LAST 363       15,3574  0 3602 0           TC    CDUINC

 0098  REF  17 LAST 363       15,3575  24 120 1           INCR  BUF
 0099  REF 224 LAST 363       15,3576  30 151 1           CAE   MPAC +5
 0100  REF   4 LAST 363       15,3577  0 3602 0           TC    CDUINC

 0101  REF   1                15,3600  1 3516 1           TCF   VECMODE

 0102  REF   7 LAST 347       15,3601   00400 0  LOCTHETA ADRES THETAD

R0103           THE FOLLOWING ROUTINE INCREMENTS IN 2S COMPLEMENT THE REGISTER WHOSE ADDRESS IS IN BUF BY THE 1S COMPL.
R0105  QUANTITY FOUND IN TEM2. THIS MAY BE USED TO INCREMENT DESIRED IMU AND OPTICS CDU ANGLES OR ANY OTHER 2S COMPL.
R0107  (+0 UNEQUAL TO -0) QUANTITY, MAY BE CALLED BY BANKCALL/SWCALL.

 0108  REF   3 LAST  20       15,3602  54 132 0  CDUINC   TS    TEM2         1S COMPL.QUANT. ARRIVES IN ACC. STORE IT
 0109  REF  18 LAST 363       15,3603  50 120 1           INDEX BUF
 0110                         15,3604  10 000 0           CCS   0            CHANGE 2S COMPL. ANGLE(IN BUF)INTO 1S
 0111  REF  39 LAST 362       15,3605  6 7763 1           AD    ONE
 0112                         15,3606  1 3612 0           TCF   +4
 0113  REF  90 LAST 363       15,3607  6 7763 1           AD    ONE
 0114  REF  91 LAST 363       15,3610  6 7763 1           AD    ONE          OVERFLOW HERE IF 2S COMPL. IS 180 DEG.
 0115                         15,3611  4 0000 0           COM

 0116  REF   4 LAST 363       15,3612  6 0132 1           AD    TEM2         ADD IN INCREMENT. WILL OVERFLOW IF RE-
C0117                                                                       SULT MOVES FROM 2ND TO 3D QUAD.(OR BACK)
 0118  REF 197 LAST 362       15,3613  10 000 0           CCS   A            BACK TO 2S COMPL.
 0119  REF  92 LAST 363       15,3614  6 7763 1           AD    ONE
 0120                         15,3615  1 3617 0           TCF   +2
 0121                         15,3616  4 0000 0           COM
 0122  REF   5 LAST 363       15,3617  54 132 0           TS    TEM2         STORE 14BIT QUANTITY WITH PRESENT SIGN
 0123                         15,3620  1 3624 0           TCF   +4
 0124  REF 198 LAST 363       15,3621  50 000 1           INDEX A            OVERFLOW MEANS CORRECT 14BIT VALUE,WRONG
C0125                                                                        SIGN.
 0126  REF   2 LAST 362       15,3622  3 7744 1           CAF   LIMITS       FIX IT,BY ADDING IN 37777 OR 40000
 0127  REF   6 LAST 363       15,3623  6 0132 1           AD    TEM2

 0128  REF  19 LAST 363       15,3624  50 120 1           INDEX BUF
 0129                         15,3625  54 000 0           TS    0            STORE NEW ANGLE IN 2S COMPLEMENT.
 0130  REF 151 LAST 362       15,3626  0 0002 0           TC    Q
```

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P0131 RTB TO TORQUE GYROS, EXCEPT FOR THE CALL TO IMUSTALL. ECADR OF COMMANDS ARRIVES IN X1.

```
0133   REF   1                15,3627   50 110 1   PULSEIMU  INDEX   FIXLOC      ADDRESS OF GYRO COMMANDS SHOULD BE IN X1
0134   REF   1                15,3630   3 0046 0              CA      X1
0135   REF   26 LAST 327      15,3631   0 5206 0              TC      BANKCALL
0136   REF   2 LAST 206       15,3632    26362 1              CADR    IMUPULSE
0137   REF   3 LAST 361       15,3633   1 6125 0              TCF     DANZIG
```

```
L       RTB OP CODES                                                    USER'S OWN PAGE NO.  6          S3

P0138           THE FOLLOWING ROUTINE IS USED ONLY IN BENCH TESTING THE RR.

0139    REF  12 LAST 222    15,3634  0 5701 1  RRSIM    TC      FIXDELAY
0140                        15,3635   00062 0            DEC     50

0141    REF  16 LAST 186    15,3636  3 7762 0  RRSIM2   CAF     BIT2        SEE IF RR ECTR ENABLED.
0142                        15,3637  0 0006 1            EXTEND
0143                        15,3640  02 012 0            RAND    12
0144                        15,3641  0 0006 1            EXTEND
0145    REF   1             15,3642  1 3634 1            BZF     RRSIM

0146    REF   7 LAST 363    15,3643  3 0132 1            CA      TEM2        SAVE EXEC TEMPS SINCE IN RUPT.
0147    REF  34 LAST 219    15,3644  54 070 1            TS      RUPTREG1
0148    REF   1             15,3645  3 3705 0            CAF     LOPTY
0149    REF  20 LAST 363    15,3646  56 120 1            XCH     BUF
0150    REF  30 LAST 219    15,3647  54 071 0            TS      RUPTREG2
0151    REF   6 LAST 176    15,3650  3 0361 0            CA      LASTYCMD    ECTR.
0152                        15,3651  6 0000 1            DOUBLE
0153                        15,3652  0 0006 1            EXTEND
0154    REF   1             15,3653  7 3706 1            MP      RRSIMG
0155    REF   5 LAST 363    15,3654  0 3602 0            TC      CDUINC
0156    REF  21 LAST 365    15,3655  24 120 1            INCR    BUF
0157    REF   8 LAST 296    15,3656  3 0035 1            CA      OPTY        SHAFT CMD IS DIVIDED BY THE ABS VALUE OF
0158                        15,3657  0 0006 1            EXTEND              THE COS OF THE TRUNNION ANGLE.
0159                        15,3660  20 007 1            MSU     7           TO 1S COMPLEMENT.
0160    REF   3 LAST 136    15,3661  0 5354 0            TC      SPCOS                                   *
0161                        15,3662  0 0006 1            EXTEND      SPCOS NOW GIVES COS SCALED AT 1     *
0162    REF  28 LAST 281    15,3663  7 7746 1            MP      BIT14       (A DAP GROUP FIX)           *
0163    REF 199 LAST 363    15,3664  10 000 0            CCS     A
0164                        15,3665  1 3670 1            TCF     +3
0165                        15,3666  1 3670 1            TCF     +2
0166                        15,3667  1 3670 1            TCF     +1
0167    REF  93 LAST 363    15,3670  6 7763 1            AD      ONE
0168    REF  56 LAST 338    15,3671  54 061 1            TS      ITEMP1

0169    REF   5 LAST 173    15,3672  3 0362 0            CA      LASTXCMD    SHAFT RATE DEPENDS ON TRUNNION.
0170                        15,3673  0 0006 1            EXTEND
0171    REF   2 LAST 365    15,3674  7 3706 1            MP      RRSIMG
0172                        15,3675  0 0006 1            EXTEND
0173    REF  57 LAST 365    15,3676  10 061 1            DV      ITEMP1
0174    REF   6 LAST 365    15,3677  0 3602 0            TC      CDUINC
0175    REF  35 LAST 365    15,3700  3 0070 0            CA      RUPTREG1
0176    REF   8 LAST 365    15,3701  54 132 0            TS      TEM2
0177    REF  31 LAST 365    15,3702  3 0071 1            CA      RUPTREG2
0178    REF  22 LAST 365    15,3703  54 120 0            TS      BUF
0179    REF   2 LAST 365    15,3704  1 3634 1            TCF     RRSIM

0180    REF   9 LAST 365    15,3705   00035 1  LOPTY    ADRES   OPTY
0181                        15,3706   22755 0  RRSIMG   DEC     .59259
R018101 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********
```

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```
 018103 REF   3 LAST 338                    E7          EBANK= DNCOUCNT

 018104 REF   4 LAST 366     15,3707  55'403 0  15INSRT  TS     DNCOUCNT

 018105 REF   1              15,3710  3 5632 0           CA     EBANK6
 018107 REF  17 LAST 332     15,3711  56 003 1           XCH    EBANK
 018109 REF  76 LAST 361     15,3712  54 001 1           TS     L

 01811  REF   1                         E6          EBANK= RGIMTIMR

 018111 REF   1              15,3713  4 3723 0           CS     GMBLBITS
 018113                      15,3714  0 0006 1           EXTEND
 018115                      15,3715  03 012 1           MASK   12

 018117 REF   1              15,3716  3 7745 0           CA     NEGMAX
 018119 REF   2 LAST 366     15,3717  55'754 1           TS     RGIMTIMR
 018121 REF   2 LAST  56     15,3720  55'753 0           TS     QGIMTIMR

 018123 REF  18 LAST 366     15,3721  22 003 1           LXCH   EBANK
 018125 REF   3 LAST 339     15,3722  1 2365 1           TCF    DNCOUSGO

 018127                      15,3723   07400 1  GMBLBITS OCT    7400

 0182                        15,3724   37777 1  CHKSUM15 OCT    37777
.R018202 **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************
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L LEM FLIGHT CONTROL SYSTEM TEST USER'S OWN PAGE NO. 1 S3

```
0001                                  06,2736          BANK   6
0002   REF   1                          E4            EBANK= JETSTEP


R0003   LEM FCS TEST  ENTRY AND INITIALIZATION JOB.

R0004        THIS JOB INITIALIZES THE ERASABLE TABLES FOR THE FCS TEST AND PUTS THE FOLLOWING PROGRAMS UNDER
R0006   WAITLIST CONTROL.
R0007             (1) RCS JET SET TASK
R0008             (2) ENGINE ON - OFF TASK
R0009             (3) DESCENT ENGINE GIMBAL TRIM TASK
R0010             (4) DESCENT ENGINE THROTTLE TASK
R0011             (5) INTERFACE CHANNEL LOOK TASK

0012   REF  12 LAST 321      06,2736  0 4644 0  FCSSTART TC     GRABWAIT      SO NOTHING DISRUPTS THE LOAD.
0013   REF   1               06,2737  3 3012 1            CAF    JSTEPADR      THE START OF THE LIST.
0014   REF 200 LAST 365      06,2740  10 000 0  FCS3       CCS    A
0015   REF 225 LAST 363      06,2741  54 146 0            TS     MPAC +2
0016   REF   1               06,2742  3 3015 0  FCS2       CAF    V04N01K       DISPLAY PRESENT CONTENTS IN R2.
0017   REF  26 LAST 322      06,2743  0 4657 1            TC     NVSBWAIT
0018   REF 226 LAST 367      06,2744  24 146 1            INCR   MPAC +2
0019   REF   1               06,2745  3 3013 0            CAF    V21N02K
0020   REF  27 LAST 367      06,2746  0 4657 1            TC     NVSBWAIT      IN CASE IT.S BUSY BUT IT SHOULDN.T BE.
0021   REF  21 LAST 322      06,2747  0 4475 0            TC     ENDIDLE       WHILE LOADING.
0022                         06,2750  0 2753 1            TC     +3            V34E. TERMINATE LOAD OF THIS LIST
A0023                                                                          SECTION, GO TO NEW SECTION OR TO TEST.
0024                         06,2751  0 2752 0            TC     +1            V33E. PRESENT CONTENTS OK, PROCEED TO
A0025                                                                         NEXT LOCATION IN LIST.
0026   REF   1               06,2752  0 2742 1            TC     FCS2
0027   REF   1               06,2753  3 3014 1            CAF    V21N30K
0028   REF  28 LAST 367      06,2754  0 4657 1            TC     NVSBWAIT
0029   REF  22 LAST 367      06,2755  0 4475 0            TC     ENDIDLE
0030   REF   8 LAST 314      06,2756  0 5566 1            TC     EJFREE
0031   REF   1               06,2757  0 2762 0            TC     FCSTEST1      PROCEED TO TEST.
0032   REF  23 LAST 301      06,2760  30 337 0            CAE    DSPTEM1       NEW ADDRESS.
0033   REF   1               06,2761  0 2740 0            TC     FCS3
0034   REF   1               06,2762  3 3016 0  FCSTEST1 CAF    V47K
0035   REF  29 LAST 367      06,2763  0 4657 1            TC     NVSBWAIT      OUR VERB IN THE LIGHTS.
0036                         06,2764  0 0004 0  FCSTEST   INHINT
0037   REF  41 LAST 331      06,2765  3 7762 0            CAF    TWO           20MS.
0038   REF  34 LAST 324      06,2766  0 5663 1            TC     WAITLIST
0039   REF   2 LAST 367                 E4               EBANK= JETSTEP
0040                         06,2767  03023 0            2CADR  JETSTART
C0040  REF   1               06,2770  14064 0
0041   REF  26 LAST 310      06,2771  3 7763 1            CAF    BIT1          10MS.
0042   REF  35 LAST 367      06,2772  0 5663 1            TC     WAITLIST
0043   REF   3 LAST 367                 E4               EBANK= JETSTEP
```

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```
 0044                          06,2773   03156 0          2CADR  ENGSTART
C0044  REF   1                 06,2774   14064 0
 0045  REF  15 LAST 333        06,2775   3 6311 1         CAF    THREE        30MS.
 0046  REF  36 LAST 367        06,2776   0 5663 1         TC     WAITLIST
 0047  REF   4 LAST 367                       E4          EBANK= JETSTEP
 0048                          06,2777   03253 0          2CADR  TRIMTOP
C0048  REF   1                 06,3000   14064 0
 0049  REF   8 LAST 321        06,3001   3 7761 0         CAF    FOUR         40MS.
 0050  REF  37 LAST 368        06,3002   0 5663 1         TC     WAITLIST
 0051  REF   5 LAST 368                       E4          EBANK= JETSTEP
 0052                          06,3003   03373 0          2CADR  THRSTART
C0052  REF   1                 06,3004   14064 0
 0053  REF   8 LAST 333        06,3005   3 7766 1         CAF    FIVE         50MS.
 0054  REF  38 LAST 368        06,3006   0 5663 1         TC     WAITLIST
 0055  REF   6 LAST 368                       E4          EBANK= JETSTEP
 0056                          06,3007   03461 1          2CADR  LODKTOP
C0056  REF   1                 06,3010   14064 0
 0057  REF   9 LAST 367        06,3011   0 5566 1         TC     EJFREE       NOW THEY START.

 0058  REF   7 LAST 368        06,3012   02007 1 JSTEPADR ECADR  JETSTEP
 0059                          06,3013   02102 0 V21N02K  DCT    02102
 0060                          06,3014   02130 1 V21N30K  DCT    02130
 0061                          06,3015   00401 1 V04N01K  DCT    00401
 0062                          06,3016   04700 1 V47K     DCT    04700
```

L LEM FLIGHT CONTROL SYSTEM TEST USER'S OWN PAGE NO. 3 S3 E4

```
P0063   LEM FCS TEST   RCS JETSET TASK
R0064       THIS JOB ISSUES A PROFILE OF  JET ON-OFF SIGNALS AS DETERMINED BY THE CONSTANTS IN A SET OF SIX REGISTERS.
R0066   THE SIX REGISTERS ARE, (1) NTIMES, THE NUMBER OF TIMES A PARTICULAR STEP WILL BE PERFORMED. (2) NEXTTIME, THE
R0068   TIME BETWEEN STEPS, A MAXIMUM OF 2 MINUTES, (3) JETONTM, THE TIME TO TURN THE JETS ON, SCALED FOR T3, (4) JET-
R0070   OFFTM, THE TIME AFTER ONTM TO TURN THE JETS OFF, (5) XJETS, THE PARTICULAR X JETS TO BE TURNED ON AND OFF
R0072   DURING EACH REPEAT OF A STEP, AND (6) YZJETS,, THE Y AND Z JETS TO BE TURNED ON AND OFF DURING EACH REPEAT OF A
R0074   STEP.  XJETS AND YZJETS MUST BE IN THE SAME FORMAT AS CHANNELS 5 AND6 RESPECTIVELY.  THERE ARE EIGHT SETS OF
R0076   THESE SIX REGISTERS.
R0077       THE REGISTER JETSTEP IS USED TO INDEX THE 8 SETS OF REGISTERS. THE ALLOWABLE VALUES OF JETSTEP ARE +0 THRU 7
R0079       THIS JOB WILL BE ENTERED BUT IMMEDIATELY ENDED IF THE INITIAL VALUES OF JETSTEP AND NTIMES ARE +0.


 0081   REF   8 LAST 368     06,3017  11'407 1  NEXTSET  CCS   JETSTEP        IT MAY BE ZERO.
 0082                        06,3020  0 3022 1           TC    +2             NOPE
 0083   REF  25 LAST 325     06,3021  0 5727 0           TC    TASKOVER       IT IS SO WE ARE DONE WITH THIS TASK.
 0084   REF   9 LAST 369     06,3022  55'407 1           TS    JETSTEP

 0085   REF  10 LAST 369     06,3023  51'407 0  JETSTART INDX  JETSTEP        ENTER HERE.
 0086   REF   1              06,3024  11'410 1           CCS   NTIMES         SEE IF THIS STEP IS FINISHED.
 0087                        06,3025  0 3027 1           TC    +2             NO
 0088   REF   1              06,3026  0 3017 1           TC    NEXTSET        YES
 0089   REF  11 LAST 369     06,3027  51'407 0           INDX  JETSTEP
 0090   REF   1              06,3030  31'420 0           CAE   NEXTTIME       MUST BE SCALED FOR T3.  REMEMBER TO BIAS
A0091                                                                         THIS FOR ON TIME.
 0092   REF  39 LAST 368     06,3031  0 5663 1           TC    WAITLIST
 0093   REF  12 LAST 369              E4                EBANK= JETSTEP
 0094                        06,3032   03046 0          2CADR JTOP
C0094   REF   1              06,3033   14064 0
 0095   REF  26 LAST 369     06,3034  0 5727 0           TC    TASKOVER

 0096   REF 104 LAST 361     06,3035  3 7767 0  JETOFF   CAF   ZERO
 0097                        06,3036  0 0006 1           EXTEND
 0098                        06,3037  01 005 0           WRITE 5
 0099                        06,3040  0 0006 1           EXTEND
 0100                        06,3041  01 006 0           WRITE 6
 0101   REF  13 LAST 369     06,3042  51'407 0           INDX  JETSTEP
 0102   REF   2 LAST 369     06,3043  11'410 1           CCS   NTIMES
 0103   REF  14 LAST 369     06,3044  51'407 0           INDX  JETSTEP
 0104   REF   3 LAST 369     06,3045  55'410 1           TS    NTIMES         ONE LESS TIME.
 0105   REF  15 LAST 369     06,3046  51'407 0  JTOP     INDX  JETSTEP
 0106   REF   4 LAST 369     06,3047  11'410 1           CCS   NTIMES         FOR LOOPING.
 0107                        06,3050  0 3052 0           TC    +2
 0108   REF   2 LAST 369     06,3051  0 3017 1           TC    NEXTSET
 0109   REF  16 LAST 369     06,3052  51'407 0           INDX  JETSTEP
 0110   REF   1              06,3053  31'430 1           CAE   JETONTM        SCALED FOR T3.  TIME FOR JETS ON.
 0111   REF  40 LAST 369     06,3054  0 5663 1           TC    WAITLIST
 0112   REF  17 LAST 369              E4                EBANK= JETSTEP
 0113                        06,3055   03060 1          2CADR JETON
C0113   REF   1              06,3056   14064 0
```

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```
0114  REF  27 LAST 369     06,3057  0 5727 0          TC     TASKOVER

0115  REF  18 LAST 369     06,3060  51'407 0  JETON   NDX    JETSTEP
0116  REF   1              06,3061  31'440 0          CAE    XJETS          MUST BE IN CHANNEL 5 FORMAT.
0117  REF   1              06,3062  55'401 1          TS     XJBUF
0118  REF  19 LAST 370     06,3063  51'407 0          NDX    JETSTEP
0119  REF   1              06,3064  31'450 1          CAE    YZJETS         MUST BE IN CHANNEL 6 FORMAT.
0120  REF   1              06,3065  55'402 1          TS     YZJBUF
0121                       06,3066  0 0006 1  JFAILCK EXTEND                 THIS ROUTINE EXAMINES EACH JETFAIL BIT
0122                       06,3067  00 032 0          READ   32              AND IF A FAILURE IS INDICATED THE CORRES
0123                       06,3070  4 0000 0          COM                    PONDING COMMANDS ARE MASKED OUT .
0124  REF   1              06,3071  55'403 0          TS     JFBUF           SAVE 32 REINVERTED.
0125  REF   8 LAST 327     06,3072  3 7765 1          CAF    SEVEN
0126  REF   1              06,3073  55'404 1  JF3     TS     FCNTR
0127  REF   2 LAST 370     06,3074  31'403 1          CAE    JFBUF
0128  REF   2 LAST 370     06,3075  51'404 0          NDX    FCNTR
0129  REF  11 LAST 190     06,3076  7 7754 1          MASK   BIT8
0130  REF 201 LAST 367     06,3077  10 000 0          CCS    A
0131  REF   1              06,3100  0 3117 0          TC     JFAIL
0132  REF   3 LAST 370     06,3101  11'404 1  JFAIL1  CCS    FCNTR
0133  REF   1              06,3102  0 3073 0          TC     JF3
0134  REF   2 LAST 370     06,3103  31'401 0          CAE    XJBUF
0135                       06,3104  0 0006 1          EXTEND
0136                       06,3105  01 005 0          WRITE  5               XJETS GO ON.
0137  REF   2 LAST 370     06,3106  31'402 0          CAE    YZJBUF
0138                       06,3107  0 0006 1          EXTEND
0139                       06,3110  01 006 0          WRITE  6               YZJETS GO ON.
0140  REF  20 LAST 370     06,3111  51'407 0          NDX    JETSTEP
0141  REF   1              06,3112  31'460 1          CAE    JETOFFTM       JET OFF TIME SCALED FOR T3.
0142  REF  41 LAST 369     06,3113  0 5663 1          TC     WAITLIST
0143  REF  21 LAST 370                E4             EBANK= JETSTEP
0144                       06,3114   03035 1          2CADR  JETOFF
C0144 REF   1              06,3115   14064 0
0145  REF  28 LAST 370     06,3116  0 5727 0          TC     TASKOVER

0146  REF   4 LAST 370     06,3117  51'404 0  JFAIL   NDX    FCNTR
0147  REF   1              06,3120  4 3142 1          CS     XJETMASK
0148  REF   3 LAST 370     06,3121  7 1401 1          MASK   XJBUF
0149  REF   4 LAST 370     06,3122  55'401 1          TS     XJBUF
0150  REF   5 LAST 370     06,3123  51'404 0          NDX    FCNTR
0151  REF   1              06,3124  4 3132 0          CS     YZJETMSK
0152  REF   3 LAST 370     06,3125  7 1402 1          MASK   YZJBUF
0153  REF   4 LAST 370     06,3126  55'402 1          TS     YZJBUF
0154  REF  32 LAST 347     06,3127  0 4755 1          TC     ALARM
0155                       06,3130   01410 0          OCT    01410           TEMPORARY JET FAIL ALARM CODE.
0156  REF   1              06,3131  0 3101 1          TC     JFAIL1
```

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```
0157                    06,3132  00010 0  YZJETMSK OCT   00010      JET 11
0158                    06,3133  00020 0           OCT   00020      JET 12
0159                    06,3134  00004 0           OCT   00004      JET 15
0160                    06,3135  00200 0           OCT   00200      JET 16
0161                    06,3136  00001 0           OCT   00001      JET 7
0162                    06,3137  00002 0           OCT   00002      JET 3
0163                    06,3140  00040 0           OCT   00040      JET 8
0164                    06,3141  00100 0           OCT   00100      JET 4

0165                    06,3142  00040 0  XJETMSK  OCT   00040      JET 10
0166                    06,3143  00020 0           OCT   00020      JET 9
0167                    06,3144  00100 0           OCT   00100      JET 13
0168                    06,3145  00200 0           OCT   00200      JET 14
0169                    06,3146  00010 0           OCT   00010      JET 6
0170                    06,3147  00001 0           OCT   00001      JET 1
0171                    06,3150  00004 0           OCT   00004      JET 5
0172                    06,3151  00002 0           OCT   00002      JET 2
```

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```
P0173   LEM FCS TEST  ENGINE ON - OFF TASK
R0174   THIS TASK TURNS THE LEM ASCENT OR DESCENT ENGINE ON AND OFF ACCORDING TOTHE CONSTANTS STORED IN THE FIVE SETS OF
R0176   REGISTERS, (1) CYLTIMES, WHICH CONTAINS THE NUMBER OF TIMES A PARTICULARSTEP WILL BE REPEATED, (2) NEXTCYLT,
R0178    WHICH CONTAINS THE TIME BETWEEN STEPS SCALED FOR T3, (3) ONTIME, WHICH CONTAINS THE TIME TO TURN THE ENGINE ON
R0180   WHICH ALSO DETERMINES THE LENGTH OF TIME THE ENGINE WILL BE OFF WITHIN A SERIES OF ON:OFF CYCLES, (4) OFFTIME,
R0182    WHICH CONTAINS THE NUMBER OF 2 MINUTES BEFORE THE ENGINE WILL BE TURNED OFF, AND (5) OFFTIMER, WHICH
R0184   CONTAINS THE RESIDUAL TIME BEFORE THE ENGINE WILL BE TURNED OFF.  OFFTIME AND OFFTIMER DETERMINE THE LENGTH
R0186   OF TIME THE ENGINE WILL BE ON IN ANY ONE CYCLE. THERE ARE THREE SETS OF THESE REGISTERS.
R0188       THE ENGSTEP REGISTER IS USED AS AN INDEX TO PICK UP A PARTICULAR SET  OF THE ABOVE 5 REGISTERS.  THIS TASK
R0190   WILL BE ENTERED BUT IMMEDIATELY ENDED IF ENGSTEP AND CYLTIMES = +0.      THE ALLOWABLE VALUES OF ENGSTEP ARE +0,
R0192   1 AND 2.


0193    REF   1                 06,3152  11,470 1  NXTONOFF CCS    ENGSTEP
0194                            06,3153  0 3155 0          TC     +2
0195    REF  29 LAST 370        06,3154  0 5727 0          TC     TASKOVER        EXIT HERE WHEN STEP AND CYL ARE +0.
0196    REF   2 LAST 372        06,3155  55,470 1          TS     ENGSTEP         ONE LESS.

0197    REF   3 LAST 372        06,3156  51,470 0  ENGSTART INDX   ENGSTEP        ENTER HERE.
0198    REF   1                 06,3157  11,471 0          CCS    CYLTIMES        NUM OF EACH  ON/OFF SET
0199                            06,3160  0 3162 1          TC     +2
0200    REF   1                 06,3161  0 3152 1          TC     NXTONOFF        NO MORE OF THIS SET
0201    REF   4 LAST 372        06,3162  51,470 0          INDX   ENGSTEP
0202    REF   1                 06,3163  31,474 1          CAE    NEXTCYLT        START OF NEXT CYCLE.
0203    REF  42 LAST 370        06,3164  0 5663 1          TC     WAITLIST
0204    REF   5 LAST 372                    E4             EBANK= ENGSTEP
0205                            06,3165   03206 0          2CADR  ENGONTM
C0205   REF   1                 06,3166   14064 0
0206    REF  30 LAST 372        06,3167  0 5727 0          TC     TASKOVER

0207    REF   3 LAST 303        06,3170  4 5210 0  ENGRESET CS     PRIO30          BITS 13 AND 14.
0208                            06,3171  0 0006 1          EXTEND
0209                            06,3172  02 011 0          RAND   11
0210    REF  29 LAST 365        06,3173  6 7746 0          AD     BIT14
0211                            06,3174  0 0006 1          EXTEND
0212                            06,3175  01 011 0          WRITE  11              ENG ON = 0, ENG OFF = 1.
0213    REF   6 LAST 372        06,3176  51,470 0          INDX   ENGSTEP
0214    REF   2 LAST 372        06,3177  11,471 0          CCS    CYLTIMES
0215    REF 202 LAST 370        06,3200  10 000 0          CCS    A
0216                            06,3201  0 3203 0          TC     +2
0217    REF   2 LAST 372        06,3202  0 3152 1          TC     NXTONOFF        WAS ONE.
0218    REF  94 LAST 365        06,3203  6 7763 1          AD     ONE             WAS MORE THAN ONE.
0219    REF   7 LAST 372        06,3204  51,470 0          INDX   ENGSTEP
0220    REF   3 LAST 372        06,3205  55,471 0          TS     CYLTIMES

0221    REF   8 LAST 372        06,3206  51,470 0  ENGONTM  INDX   ENGSTEP
0222    REF   1                 06,3207  31,502 1          CAE    OFFTIME
0223    REF   1                 06,3210  55,406 0          TS     OFFTMBUF
0224    REF   9 LAST 372        06,3211  51,470 0          INDX   ENGSTEP
```

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```
 0225  REF   1                 06,3212  31'477 1          CAE    ONTIME
 0226  REF  43 LAST 372        06,3213  0 5663 1          TC     WAITLIST
 0227  REF  10 LAST 372                  E4                EBANK= ENGSTEP
 0228                         06,3214   03217 0          2CADR  ENGSET
C0228  REF   1                 06,3215   14064 0
 0229  REF  31 LAST 372        06,3216  0 5727 0          TC     TASKOVER

 0230  REF   4 LAST 372        06,3217  4 5210 0  ENGSET  CS     PRIO30
 0231                         06,3220  0 0006 1          EXTEND
 0232                         06,3221  02 011 0          RAND   11
 0233  REF  17 LAST 216        06,3222  6 7747 1          AD     BIT13
 0234                         06,3223  0 0006 1          EXTEND
 0235                         06,3224  01 011 0          WRITE  11          ENG ON = 1, ENG OFF = 0.
 0236  REF   2 LAST 372        06,3225  11'406 0  ENGRST  CCS    OFFTMBUF
 0237  REF   1                 06,3226  0 3235 0          TC     LTIMEON    AT LEAST 2MIN. BEFORE ENGINE OFF.
 0238  REF  11 LAST 373        06,3227  51'470 0          INDX   ENGSTEP
 0239  REF   1                 06,3230  31'505 0          CAE    OFFTIMER   LESS THAN 2MIN. TO ENGINE OFF.
 0240  REF  44 LAST 373        06,3231  0 5663 1          TC     WAITLIST
 0241  REF  12 LAST 373                  E4                EBANK= ENGSTEP
 0242                         06,3232   03170 1          2CADR  ENGRESET
C0242  REF   1                 06,3233   14064 0
 0243  REF  32 LAST 373        06,3234  0 5727 0          TC     TASKOVER

 0244  REF   3 LAST 373        06,3235  11'406 0  LTIMEON  CCS    OFFTMBUF   IS THERE ANY MORE.
 0245                         06,3236  0 3240 1          TC     +2         YES.
 0246  REF   1                 06,3237  0 3225 1          TC     ENGRST     NO.
 0247  REF   4 LAST 373        06,3240  55'406 0          TS     OFFTMBUF   ONE LESS.
 0248  REF   1                 06,3241  3 3246 1          CAF    2MIN
 0249  REF  45 LAST 373        06,3242  0 5663 1          TC     WAITLIST
 0250  REF  13 LAST 373                  E4                EBANK= ENGSTEP
 0251                         06,3243   03235 0          2CADR  LTIMEON
C0251  REF   2 LAST 373        06,3244   14064 0
 0252  REF  33 LAST 373        06,3245  0 5727 0          TC     TASKOVER

 0253                         06,3246   27340 0  2MIN    DEC    12000
```

L LEM FLIGHT CONTROL SYSTEM TEST USER'S OWN PAGE NO. 8 S3 E4

```
P0254   LEM FCS TEST  TRIM TASK
R0255   THIS PROGRAM ISSUES A PROFILE OF PITCH AND ROLL TRIM COMMANDS TO THE LEM DESCENT ENGINE GIMBAL IN ACCORDANCEWITH
R0257   THE VALUE S IN THE TRIMSTEP REGISTER AND THE 12 SETS OF 5 REGISTERS CALLED NUMTIMES, STEPDLYT, TRIMONT, TRIMOFFT
R0259   AND TRIMIND.  TRIMSTEP IS USED TO PICK UP A PARTICULAR SET OF THE 5 REGISTERS AND HAS ALLOWABLE VALUES FROM +0
R0261   THROUGH +11 DECIMAL.  THE 5 REGISTERS IN EACH SET ARE DEFINED AS FOLLOWS
R0262       (1) NUMTIMES DETERMINES THE NUMBER OF TIMES THE COMMAND IN TRIMIND  WILL BE ISSUED.  VALUES FROM +0 TO
R0264   OCT 37777 ARE PERMITTED.
R0265       (2) STEPDLYT DETERMINES THE TIME BETWEEN THE START OF A STEP AND THE BEGINNING OF TRIMONT.  STEPDLYT MUST BE
R0267   FORMATTED FOR T3, ITS MAXIMUM VALUE IS 2 MINUTES.
R0268       (3) TRIMONT DETERMINES THE TIME BETWEEN THE END OF STEPDLYT OR TRIMOFFT AND THE TIME THE TRIM COMMANDS ARE
R0270   ISSUED.  IT MUST BE FORMATTED FOR T3.
R0271       (4) TRIMOFFT DETERMINES THE LENGTH OF TIME THE TRIM COMMAND WILL BE ON, FORMATTED FOR T3.
R0273       (5) TRIMIND DETERMINES THE PITCH AND ROLL COMMAND TO BE ISSUED.  THE FORMAT IS, BIT9=1=+ PITCH COMMAND,
R0275   BIT10=1=-PITCH, BIT11=1= +ROLL, BIT12=1= -ROLL.  A BIT=0 INDICATES NO COMMAND.  ANY COMBINATION OF COMMANDS IS
R0277   PERMITTED.
R0278      THIS TASK WILL BE ENTERED BUT IMMEDIATELY ENDED IF TRIMSTEP AND NUMTIMES = +0.


0280  REF   1              06,3247  11,510 0  NEXTTRIM CCS    TRIMSTEP
0281                       06,3250  0 3252 1           TC     +2
0282  REF  34 LAST 373     06,3251  0 5727 0           TC     TASKOVER      EXIT HERE.
0283  REF   2 LAST 374     06,3252  55,510 0           TS     TRIMSTEP      LESS ONE.

0284  REF   3 LAST 374     06,3253  51,510 1  TRIMTOP  INDX   TRIMSTEP      ENTER HERE.
0285  REF   1              06,3254  11,511 1           CCS    NUMTIMES
0286                       06,3255  0 3257 1           TC     +2
0287  REF   1              06,3256  0 3247 0           TC     NEXTTRIM
0288  REF   4 LAST 374     06,3257  51,510 1           INDX   TRIMSTEP
0289  REF   1              06,3260  31,525 1           CAE    STEPDLYT
0290  REF  46 LAST 373     06,3261  0 5663 1           TC     WAITLIST
0291  REF   5 LAST 374                E4               EBANK= TRIMSTEP
0292                       06,3262   03300 1           2CADR  TRIMSET
C0292 REF   1              06,3263   14064 0
0293  REF  35 LAST 374     06,3264  0 5727 0           TC     TASKOVER

0294  REF   1              06,3265  4 3364 1  TRIMOFF  CS     TRIMMASK
0295                       06,3266  0 0006 1           EXTEND
0296                       06,3267  03 012 1           MASK   12             TRIM GOES OFF.
0297  REF   6 LAST 374     06,3270  51,510 1  NUMSTEP  INDX   TRIMSTEP
0298  REF   2 LAST 374     06,3271  11,511 1           CCS    NUMTIMES
0299  REF 203 LAST 372     06,3272  10 000 0           CCS    A
0300                       06,3273  0 3275 1           TC     +2
0301  REF   2 LAST 374     06,3274  0 3247 0           TC     NEXTTRIM      WAS ONE.
0302  REF  95 LAST 372     06,3275  6 7763 1           AD     ONE
0303  REF   7 LAST 374     06,3276  51,510 1           INDX   TRIMSTEP
0304  REF   3 LAST 374     06,3277  55,511 1           TS     NUMTIMES
0305  REF   8 LAST 374     06,3300  51,510 1  TRIMSET  INDX   TRIMSTEP
0306  REF   1              06,3301  31,541 0           CAE    TRIMONT
0307  REF  47 LAST 374     06,3302  0 5663 1           TC     WAITLIST
```

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```
 0308   REF  9 LAST 374                    E4          EBANK=  TRIMSTEP
 0309                          06,3303   03306 1       2CADR   TRIMON
C0309   REF  1                 06,3304   14064 0
 0310   REF 36 LAST 374        06,3305   0 5727 0      TC      TASKOVER

 0311   REF  1                 06,3306   3 3363 1 TRIMON CAF   BITS9,10      CHECK PITCH AND ROLL TRIM FAIL BITS.
 0312                          06,3307   0 0006 1       EXTEND
 0313                          06,3310   06 032 0       RXOR    32
 0314   REF  2 LAST 375        06,3311   7 3363 0       MASK    BITS9,10
 0315                          06,3312   0 0006 1       EXTEND
 0316   REF  1                 06,3313   1 3321 0       BZF     TRIMON1
 0317   REF  1                 06,3314   3 5656 1       CAF     PRIO35        FAIL IS ON. FLASH FAIL CODE (01400) AND
 0318   REF 15 LAST 324        06,3315   0 5505 1       TC      NOVAC         IDLE UNTIL SOMEONE RESETS IT. TERMINATES
 0319   REF 22 LAST 370                      E4          EBANK=  JETSTEP
 0320                          06,3316   03334 0       2CADR   PERFORM       THE TASK, OR DECIDES TO PROCEED WITH IT.
C0320   REF  1                 06,3317   14064 0
 0321   REF 37 LAST 375        06,3320   0 5727 0      TC      TASKOVER

 0322   REF 10 LAST 375        06,3321   51'510 1 TRIMON1 NDX   TRIMSTEP
 0323   REF  1                 06,3322   31'571 0       CAE     TRIMIND
 0324   REF  2 LAST 374        06,3323   7 3364 1       MASK    TRIMMASK      SAFETY PLAY
 0325                          06,3324   0 0006 1       EXTEND
 0326                          06,3325   05 012 1       WOR     12            TRIM STARTS.
 0327   REF 11 LAST 375        06,3326   51'510 1       NDX     TRIMSTEP
 0328   REF  1                 06,3327   31'555 0       CAE     TRIMOFFT
 0329   REF 48 LAST 374        06,3330   0 5663 1       TC      WAITLIST
 0330   REF 12 LAST 375                      E4          EBANK=  TRIMSTEP
 0331                          06,3331   03265 0       2CADR   TRIMOFF
C0331   REF  1                 06,3332   14064 0
 0332   REF 38 LAST 375        06,3333   0 5727 0      TC      TASKOVER

 0333   REF 13 LAST 367        06,3334   0 4644 0 PERFORM TC    GRABWAIT      KEY RELEASE MAY COME ON.
 0334   REF  1                 06,3335   3 3363 1       CAF     TRIMCODE      01400
 0335   REF 24 LAST 367        06,3336   54 337 1       TS      DSPTEM1
 0336   REF  1                 06,3337   3 3365 1       CAF     V01N25K
 0337   REF 30 LAST 367        06,3340   0 4657 1       TC      NVSBWAIT
 0338   REF  1                 06,3341   3 3366 1       CAF     V50K          PLEASE PERFORM.
 0339   REF 31 LAST 375        06,3342   0 4657 1       TC      NVSBWAIT
 0340   REF  6 LAST 283        06,3343   0 4622 0       TC      FLASHON       ANY RESPONSE TURNS IT OFF.
 0341   REF 23 LAST 367        06,3344   0 4475 0       TC      ENDIDLE       WAIT FOR SOMEONE TO DO SOMETHING.
 0342   REF 10 LAST 368        06,3345   0 5566 1       TC      EJFREE        V34E. TERMINATE THE TASK.
 0343   REF  1                 06,3346   0 3355 1       TC      TR1           V33E. PROCEED WITH THE FAIL ON.
 0344                          06,3347   0 0004 0       INHINT                ENTER. THE FAIL HAS BEEN RESET.
 0345   REF 17 LAST 365        06,3350   3 7762 0       CAF     BIT2          20MS.
 0346   REF 49 LAST 375        06,3351   0 5663 1       TC      WAITLIST
 0347   REF 23 LAST 375                      E4          EBANK=  JETSTEP
 0348                          06,3352   03306 1       2CADR   TRIMON        CHECK AGAIN TO BE SURE. THEN PROCEED..
C0348   REF  2 LAST 375        06,3353   14064 0
 0349   REF 11 LAST 375        06,3354   0 5566 1       TC      EJFREE
```

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0350                          06,3355  0 0004 0  TR1      INHINT              PROCEED WITH THE FAIL.
0351  REF  18 LAST 375        06,3356  3 7762 0           CAF     BIT2        20MS.
0352  REF  50 LAST 375        06,3357  0 5663 1           TC      WAITLIST
0353  REF  24 LAST 375                     E4            EBANK=  JETSTEP
0354                          06,3360    03321 1         2CADR   TRIMON1     BYPASS THE RECHECK.
C0354 REF   2 LAST 375        06,3361    14064 0
0355  REF  12 LAST 375        06,3362  0 5566 1           TC      EJFREE

0356                          06,3363    01400 1 BIT59,10 OCT     01400
0357  REF   3 LAST 375                   06,3363 TRIMCODE EQUALS BIT59,10
0358                          06,3364    07400 1 TRIMMASK OCT     07400
0359                          06,3365    00125 1 V01N25< OCT      00125
0360                          06,3366    05000 1 V50K    OCT      05000
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L LEM FLIGHT CONTROL SYSTEM TEST USER'S OWN PAGE NO. 11 S3 E4

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P0361   LEM FCS TEST  THROTTLE TASK
R0362      THIS PROGRAM ISSUES A PROFILE OF THROTTLE COMMANDS TO THE LEM DESCENT ENGINE.  THE PROFILE IS DETERMINED BY
R0364   THE VALUES IN THE THRTSTEP REGISTER AND THE 6  SETS OF REGISTERS, 5 PER SET, CALLED  DOTIMES, DELAY, THRITIME,
R0366   THCOMM1 AND THCOMM2.  THE THRTSTEP REGISTER VALUE IS USED TO INDEX THE  6  SETS OF 5 REGISTERS AND HAS ALLOWABLE
R0368   VALUES OF +0 THROUGH +5.  THE 5 REGISTERS PER SET ARE DEFINED AS FOLLOWS
R0369      (1) DOTIMES DETERMINES THE NUMBER OF TIMES THE THROTTLE WILL BE EXERCISED AS PER THE VALUES OF THRITIME,
R0371   THCOMM1 AND THCOMM2 OF THE CURRENT STEP.  IT HAS ALLOWABLE VALUES OF +0 THROUGH 37777 OCT.
R0373      (2) DELAY DETERMINES THE TIME BETWEEN THE START OF A STEP AND THE BE GINNING OF THRITIME. ITIS CALLED ONLY
R0375   ONCE PER STEP,I.E., REPEATS OF THE SAME THCOMM1 AND THCOMM2 START AT THRITIME.  DELAY MUST BE FORMATTED FOR T3
R0377   AND HENCE HAS A MAXIMUM VALUE OF 2 MINUTES.
R0378      (3) THRITIME DETERMINES THE TIME BETWEEN THE END OF DELAY OR THE END  OF THCOMM2 AND THE START OF
R0380   THCOMM1.  IT MUST BE FORMATTED FOR T3.
R0381      (4) THCOMM1 AND (5) THCOMM2 DETERMINE THE NUMBER OF THRUST INCREASE  OR DECREASE PULSES TOBE ISSUED AT A
R0383   3.2KPPS RATE.  THE RANGE OF POSSIBLE VALUES OF EITHER IS FROM POSMAX (OCT 37777) TO NEGMAX (OCT 40000) ALTHOUGH
R0385   THE ACTUAL THROTTLE RANGE IS FROM OCT 6116 TO OCT 71661 (+,- 3150 DEC).
R0386      THIS TASK WILL BE ENTERED BUT IMMEDIATELY ENDED IF THE INITIAL VALUES OF THRTSTEP AND DOTIMES ARE +0.

 0388   REF   1                 06,3367  11'605 1  NEXTTHRT CCS    THRTSTEP
 0389                           06,3370  0 3372 1           TC     +2
 0390   REF  39 LAST 375        06,3371  0 5727 0           TC     TASKOVER      EXIT HERE.
 0391   REF   2 LAST 377        06,3372  55'605 1           TS     THRTSTEP

 0392   REF   3 LAST 377        06,3373  51'605 0  THRSTART INDX   THRTSTEP     ENTER HERE.
 0393   REF   1                 06,3374  11'606 1           CCS    DOTIMES       NUMBER OF TIMES COMMANDS 1 AND 2 DONE.
 0394                           06,3375  0 3377 1           TC     +2
 0395   REF   1                 06,3376  0 3367 0           TC     NEXTTHRT
 0396   REF   4 LAST 377        06,3377  51'605 0           INDX   THRTSTEP
 0397   REF   1                 06,3400  31'614 0           CAE    DELAY         TIME BETWEEN STEPS.  BIAS FOR THRITIME.
A0398                                                                            MUST BE SCALED FOR T3.
 0399   REF  51 LAST 376        06,3401  0 5663 1           TC     WAITLIST
 0400   REF   5 LAST 377                 E4                EBANK= THRTSTEP
 0401                           06,3402   03425 1          2CADR  THROTON1
C0401   REF   1                 06,3403   14064 0
 0402   REF  40 LAST 377        06,3404  0 5727 0           TC     TASKOVER

 0403   REF   6 LAST 377        06,3405  51'605 0  THR2COMM INDX   THRTSTEP
 0404   REF   1                 06,3406  31'636 0           CAE    THCOMM2       SAME REMARKS AS FOR THCOMM1.
 0405   REF   1                 06,3407  0 3443 1           TC     THROTON
 0406   REF  27 LAST 367        06,3410  6 7763 1           AD     BIT1          10MS IN CASE OF NO THCOMM2.
 0407   REF  52 LAST 377        06,3411  0 5663 1           TC     WAITLIST
 0408   REF   7 LAST 377                 E4                EBANK= THRTSTEP
 0409                           06,3412   03415 1          2CADR  CKDOTIME
C0409   REF   1                 06,3413   14064 0
 0410   REF  41 LAST 377        06,3414  0 5727 0           TC     TASKOVER

 0411   REF   8 LAST 377        06,3415  51'605 0  CKDOTIME INDX   THRTSTEP
 0412   REF   2 LAST 377        06,3416  11'606 1           CCS    DOTIMES
 0413   REF 204 LAST 374        06,3417  10 000 0           CCS    A
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```
0414                        06,3420  0 3422 0           TC     +2
0415  REF   2 LAST 377     06,3421  0 3367 0           TC     NEXTTHRT      WAS ONE.
0416  REF  96 LAST 374     06,3422  6 7763 1           AD     ONE
0417  REF   9 LAST 377     06,3423  51'605 0           NDX    THRTSTEP
0418  REF   3 LAST 377     06,3424  55'606 1           TS     DOTIMES
0419  REF  10 LAST 378     06,3425  51'605 0 THROTON1  NDX    THRTSTEP
0420  REF   1               06,3426  31'622 0           CAE    THRITIME      TIME BETWEEN DOTIMES.  SCALED FOR T3.
0421  REF  53 LAST 377     06,3427  0 5663 1           TC     WAITLIST
0422  REF  11 LAST 378                   E4           EBANK= THRTSTEP
0423                        06,3430   03433 0          2CADR  THR1COMM
C0423 REF   1               06,3431   14064 0
0424  REF  42 LAST 377      06,3432  0 5727 0           TC     TASKOVER

0425  REF  12 LAST 378      06,3433  51'605 0 THR1COMM  NDX    THRTSTEP
0426  REF   1               06,3434  31'630 0           CAE    THCOMM1       SHOULD BE NO LARGER THAN 3150DEC.
0427  REF   2 LAST 377      06,3435  0 3443 1           TC     THROTON
0428  REF   1               06,3436  6 3460 0           AD     250MS         SO ACE CAN SAMPLE.
0429  REF  54 LAST 378      06,3437  0 5663 1           TC     WAITLIST
0430  REF  13 LAST 378                   E4           EBANK= THRTSTEP
0431                        06,3440   03405 0          2CADR  THR2COMM
C0431 REF   1               06,3441   14064 0
0432  REF  43 LAST 378      06,3442  0 5727 0           TC     TASKOVER

0433  REF   2 LAST  88      06,3443  54 055 0 THROTON   TS     THRJST        THROTTLE OUTPUT COUNTER.
0434  REF   1               06,3444  55'405 0           TS     THBJF         SAVE FOR BZMF.
0435  REF  23 LAST 251      06,3445  3 7760 1           CAF    BIT4
0436                        06,3446  0 0006 1           EXTEND
0437                        06,3447  05 014 1           WOR    14            ENABLE THRUST DRIVE.  COMMAND STARTS NOW
0438  REF   2 LAST 378      06,3450  31'405 1           CAE    THBJF
0439                        06,3451  0 0006 1           EXTEND
0440                        06,3452  6 3454 1           BZMF   +2
0441                        06,3453  4 0000 0           COM
0442                        06,3454  4 0000 0           COM
0443                        06,3455  0 0006 1           EXTEND
0444  REF  30 LAST 311      06,3456  7 7752 1           MP     BIT10         SCALES FOR T3.
0445  REF 152 LAST 363      06,3457  0 0002 0           TC     Q

0446                        06,3460   00031 0 250MS     DEC    00031
```

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P0447 LEM FCS TEST INTERFACE LOOK TASK.

R0448 THIS PROGRAM KEEPS A RUNNING HISTORY OF THE STATE OF ALL THE BITS IN INPUT CHANNELS 30, 31, 32 AND 33.
R0450 IT DOES THIS BY DETECTING A CHANGE OF AN INPUT BIT FROM AN INITIAL ONE STATE TO A ZERO STATE OR FROM AN INITIAL
R0452 ZERO TO A ONE. THE HISTORY IS MAINTAINED IN TWO BUFFER REGISTERS FOR EACH CHANNEL, ONE FOR STORING ONE TO ZERO
R0454 CHANGES (30BUF1, +1, +2, AND +3) AND ONE FOR ZERO TO ONE CHANGES (30BUF0, +1 +2 AND +3). THE OPERATOR MUST
R0456 LOAD THE INITIAL STATES OF THE INPUT CHANNELS INTO THEIR RESPECTIVE BUFFER REGISTERS BEFORE THIS PROGRAM IS IN-
R0458 ITIATED.
R0459 TO ALLOW THIS PROGRAM TO RUN C(QUITLOOK) MUST BE SET GREATER THAN +0 BEFORE IT IS STARTED. IF THE OPERATOR
R0461 DOES NOT DESIRE THIS PROGRAM TO RUN HE SHOULD SET C(QUITLOOK)=+0 BEFORE STARTING THE FCS TEST. AFTER THIS TASK
R0463 IS RUNNING THE OPERATOR CAN STOP IT BY SETTING C(QUITLOOK) = +0.
R0464 NO DISPLAYS OF EITHER THE BUFFER REGISTERS OR CHANNELS ARE INCORPORATED INTO THIS PROGRAM. THIS WAS DONE TO
R0466 ALLOW THE TEST OPERATOR MONITORING FLEXIBILITY. FOR REAL TIME MONITORING IT IS SUGGESTED THAT THE BUFFER
R0468 REGISTERS BE DISPLAYED WITH THE MONITOR VERBS (11 THROUGH 15). ON THE OTHER HAND, THE OPERATOR MAY ELECT TO
R0470 PERFORM NO REAL TIME MONITORING UNTIL THE TEST IS COMPLETED, WHEN THE BUFFER REGISTERS WOULD BE CALLED FOR
R0472 DISPLAY (VERB 01) AND RECORDED.
R0473 THIS PROGRAM IS PRIMARILY INTENDED FOR INTERFACE MONITORING DURING THE LEM VIBRATION TEST AT BETHPAGE, N.Y.,
R0475 ALTHOUGH IT MAY ALSO BE USEFUL DURING VEHICAL LEVEL EMI TESTS.

```
0476  REF   1                 06,3461  11'654 0  LOOKTOP  CCS    QUITLOOK        IS THIS TASK WANTED.
0477                          06,3462  0 3464 1           TC     +2              YES.
0478  REF  44 LAST 378        06,3463  0 5727 0           TC     TASKOVER        NO.
0479  REF  16 LAST 368        06,3464  3 6311 1           CAF    THREF           START SCAN OF CHANNELS.
0480  REF   1                 06,3465  55'655 1  LOOKLOOP TS     CHCNTR          3, 2, 1, 0.
0481  REF   2 LAST 379        06,3466  51'655 0           NDX    CHCNTR
0482  REF   1                 06,3467  31'644 0           CAE    30BJF1
0483                          06,3470  0 0006 1           EXTEND
0484  REF   3 LAST 379        06,3471  5 1655 0           NDX    CHCNTR
0485                          06,3472  02 030 0           RAND   30              DETECTS CHANGES FROM 1 TO 0.
0486  REF   4 LAST 379        06,3473  51'655 0           NDX    CHCNTR
0487  REF   2 LAST 379        06,3474  57'644 0           XCH    30BJF1          STORE NEW ZEROS.
0488  REF   5 LAST 379        06,3475  51'655 0           NDX    CHCNTR
0489  REF   1                 06,3476  31'650 0           CAE    30BJF0
0490                          06,3477  0 0006 1           EXTEND
0491  REF   6 LAST 379        06,3500  5 1655 0           NDX    CHCNTR
0492                          06,3501  04 030 0           RDR    30              DETECTS CHANGES FROM 0 TO 1.
0493  REF   7 LAST 379        06,3502  51'655 0           NDX    CHCNTR
0494  REF   2 LAST 379        06,3503  57'650 0           XCH    30BJF0          STORE NEW ONES.
0495  REF   8 LAST 379        06,3504  11'655 1           CCS    CHCNTR          IS THIS SCAN DONE.
0496  REF   1                 06,3505  0 3465 0           TC     LOOKLOOP        NO.
0497  REF   4 LAST 310        06,3506  3 4570 1           CAF    TEN             YES.  100MS RECALL.
0498  REF  55 LAST 378        06,3507  0 5663 1           TC     WAITLIST
0499  REF   2 LAST 379                        E4          EBANK= QUITLOOK
0500                          06,3510   03461 1          2CADR  LOOKTOP
C0500 REF   2 LAST 368        06,3511   14064 0
0501  REF  45 LAST 379        06,3512  0 5727 0           TC     TASKOVER
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```
0001                                14,2000          BANK    14
0002  REF  15 LAST 350               E5               EBANK=  XSM


0003  REF  37 LAST 378  14,2000  3 7763 1  AOTNBIMU  CAF     ONE          AOT-NB-IMU FINE ALIGNMENT TEST
0004  REF   1           14,2001  55,512 1            TS      ERASPTN      ... TEST CAPABILITY ...

0005  REF  27 LAST 364  14,2002  0 5206 0            TC      BANKCALL
0006  REF   2 LAST 203  14,2003   26000 0            CADR    IMUZERO      IMU ZERO ENCODER MODE
0007  REF   7 LAST 358  14,2004  0 6112 0            TC      INTPRET
0008                    14,2005   77624 1            CALL
0009  REF   1           14,2006   30553 1                    LATAZCHK     TO LOAD AZIMUTH (SM) AND LATITUDE
0010                    14,2007   77624 1            CALL
0011  REF   1           14,2010   30325 0                    MAKEXSMD     TO SET UP A STABLE MEMBER DESIRED MATRIX
0012                    14,2011   45014 0            SET     CALL
0013  REF   1           14,2012   00065 1                    COAROFIN     FOR COARSE OR FINE ALIGN MARKS
0014  REF   1           14,2013   30407 1                    ERTHRVSE     TO CALCULATE EARTH RATE VECTOR
0015                    14,2014   77776 1            EXIT

0016  REF   1           14,2015  3 3700 0  POSLOAD  CAF     V24N32OE     R1  0000X ENTER    POSITION 1,2, OR 3
0017  REF  32 LAST 375  14,2016  0 4657 1            TC      NVSBWAIT     R2  00000 ENTER    00001 FOR LAB OPTION
0018  REF  24 LAST 375  14,2017  0 4475 0            TC      ENDIDLE
0019  REF   1           14,2020  1 2770 1            TCF     ENDTEST
0020                    14,2021  1 2015 0            TCF     -4
0021  REF  25 LAST 375  14,2022   56 337 0           XCH     DSPTEM1      DO NOT USE POSITION 3 WITH NAV BASE AT
0022  REF   1           14,2023  55,544 1            TS      POSITON         ZERO DEGREE TILT ANGLE. (GIMBAL LOCK)

0023  REF  26 LAST 380  14,2024   10 340 1           CCS     DSPTEM1 +1
0024  REF   1           14,2025  1 3003 0            TCF     LEMLAB       SPECIAL LAB TEST TO BYPASS MARKS

0025  REF   1           14,2026  0 2621 0            TC      POSNJUMP     SET UP STABLE MEMBER DESIRED COORDINATES

0026  REF   1           14,2027  0 2524 0            TC      OPTDATA      TARGETS 1,2 AZIMUTH AND ELEVATION

0027  REF   1           14,2030  0 2135 1            TC      FINDNAVB     COARSE ALIGN MARKS

0028  REF  28 LAST 380  14,2031  0 5206 0            TC      BANKCALL
0029  REF   5 LAST 206  14,2032   26751 0            CADR    IMUSTALL     INSURE IMUZERO COMPLETION
0030  REF   2 LAST 380  14,2033  1 2770 1            TCF     ENDTEST

0031  REF   1           14,2034  0 2247 1            TC      PUTPOSX      TO COARSE ALIGN STABLE MEMBER

0032  REF   1           14,2035  0 2762 0            TC      GMLCKCHK     CHECK FOR GIMBAL LOCK BEFORE FINE ALIGN
0033  REF   1           14,2036  0 2752 0            TC      OGCZERO      FOR EARTH RATE COMPENSATION

0034  REF  29 LAST 380  14,2037  0 5206 0            TC      BANKCALL
0035  REF   2 LAST 206  14,2040   26252 0            CADR    IMUFINE      FINE ALIGN MODE
0036  REF  30 LAST 380  14,2041  0 5206 0            TC      BANKCALL
0037  REF   6 LAST 380  14,2042   26751 0            CADR    IMUSTALL
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L IMJ PERFORMANCE TESTS 1 USER'S OWN PAGE NO. 2 S3 E5

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0038  REF   3 LAST 380   14,2043  1 2770 1            TCF    ENDTEST

0039  REF   2 LAST 380   14,2044  0 2135 1            TC     FINDNAVB      FINE ALIGN MARKS

0040  REF   9 LAST 327   14,2045  0 4724 1            TC     FREEDSP       FREE DISPLAY SYSTEM

0041  REF   1            14,2046  0 2263 1            TC     SMDCALC       TO FINE ALIGN STABLE MEMBER

0042  REF  31 LAST 380   14,2047  0 5206 0 ERFINAL    TC     BANKCALL      LAST EARTH RATE SHOT
0043  REF   1            14,2050   30424 0            CADR   EARTHR
0044  REF   2 LAST 380   14,2051  11'512 1            CCS    EROPTN        IF DESIRED TO COMPENSATE CONTINUALLY
0045  REF   1            14,2052  1 2065 1            TCF    MONSTART          CHANGE BY V21 NO2 E XXXXX E 00000 E
0046  REF   1            14,2053  1 2047 1            TCF    ERFINAL
0047  REF   4 LAST 381   14,2054  1 2770 1            TCF    ENDTEST
0048  REF   3 LAST 381   14,2055  55'512 1            TS     EROPTN
0049                     14,2056  0 0004 0            INHINT
0050  REF   1            14,2057  3 5644 1            CAF    PRIO21        PRIORITY 1 HIGHER THAN SXTNBIMJ
0051  REF  10 LAST 325   14,2060  0 5516 0            TC     FINDVAC
00515 REF  16 LAST 380              E5                EBANK= XSM
0052                     14,2061   03105 0            2CADR  RDR37511
C0052 REF   1            14,2062   30065 1
0053                     14,2063  0 0003 1            RELINT
0054  REF   2 LAST 381   14,2064  0 2047 0            TC     ERFINAL

0055  REF   3 LAST 226   14,2065  0 5026 0 MONSTART   TC     FIVETIME      TIME AT INITIAL MISALIGNMENT
0056  REF 227 LAST 367   14,2066  52 145 0            DXCH   MPAC
0057                     14,2067  0 0003 1            RELINT
0058  REF 105 LAST 369   14,2070  3 7767 0            CAF    ZERO          ZERO PIPA COUNTERS
0059  REF   5 LAST 360   14,2071  54 037 1            TS     PIPAX
0060  REF   3 LAST 360   14,2072  54 040 1            TS     PIPAY
0061  REF   4 LAST 360   14,2073  54 041 0            TS     PIPAZ
0062  REF   1            14,2074  55'551 0            TS     STOREPL
0063  REF   1            14,2075  55'537 0            TS     NDXCTR
0064  REF   1            14,2076  0 2477 1            TC     STORSLT       STORE T(INITIAL) AND PIPAI = 0

0065                     14,2077  0 0004 0            INHINT
0066  REF   1            14,2100  3 3711 0            CAF    60SEC         INSURE PIPAI VARIES IN ONE DIRECTION
0067  REF  56 LAST 379   14,2101  0 5663 1            TC     WAITLIST
00675 REF  17 LAST 381              E5                EBANK= XSM
0068                     14,2102   02106 1            2CADR  PIP1
C0068 REF   1            14,2103   30065 1
0069  REF   1            14,2104  3 2134 0            CAF    PIP2ADR
0070  REF   6 LAST 307   14,2105  0 5545 0            TC     JOBSLEEP

0071  REF   2 LAST 381   14,2106  3 2134 0 PIP1       CAF    PIP2ADR
0072  REF   6 LAST 309   14,2107  0 5551 0            TC     JOBWAKE
0073  REF  46 LAST 379   14,2110  0 5727 0            TC     TASKOVER

0074  REF   1            14,2111  31'542 0 PIP2       CAE    PIPNDX
0075  REF   1            14,2112  55'541 1            TS     PIPINDEX      POS1 PIPAY    POS2 PIPAX    POS3 PIPAX
```

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```
0076  REF  32 LAST 381   14,2113  0 5206 0          TC     BANKCALL
0077  REF   1            14,2114   51737 0          CADR   DOCHECKG      SYNC ON PIPA PULSE

0078                     14,2115  0 0003 1          RELINT
0079  REF   2 LAST 381   14,2116  0 2477 1          TC     STORRSLT      STORE TIME AND PIPA1

0080  REF   2 LAST 381   14,2117  31'543 1          CAE    PIPNDX +1
0081  REF   2 LAST 381   14,2120  55'541 1          TS     PIPINDEX      POS1 PIPAZ    POS2 PIPAY    POS3 PIPAZ
0082  REF  33 LAST 382   14,2121  0 5206 0          TC     BANKCALL
0083  REF   2 LAST 382   14,2122   51737 0          CADR   DOCHECKG      SYNC ON PIPA PULSE

0084                     14,2123  0 0003 1          RELINT
0085  REF   3 LAST 382   14,2124  0 2477 1          TC     STORRSLT      STORE TIME AND PIPA1

0086                     14,2125  0 0004 0          INHINT
0087  REF   1            14,2126  3 3710 1          CAF    30SEC         MONITOR PIPAS AT 30 SECOND INTERVALS
0088  REF  57 LAST 381   14,2127  0 5663 1          TC     WAITLIST
00885 REF  18 LAST 381                E5           EBANK= XSM
0089                     14,2130   02106 1          2CADR  PIP1
C0089 REF   2 LAST 381   14,2131   30065 1
0090  REF   3 LAST 381   14,2132  3 2134 0          CAF    PIP2ADR
0091  REF   7 LAST 381   14,2133  0 5545 0          TC     JOBSLEEP
0092  REF   1            14,2134   30111 0 PIP2ADR CADR   PIP2
```

```
0093                          14,2135  0 0006 1  FINDNAVB  EXTEND                MARKS * CALC NB OR SM WRT EARTH REF
0094   REF   5 LAST 211      14,2136  23,546 1            DXCH   DPLACE

0100   REF  34 LAST 382      14,2137  0 5206 0            TC     BANKCALL
0101   REF   1               14,2140   27046 0           CADR   MKRELEAS          RELEASE MARK SYSTEM
0102   REF  38 LAST 380      14,2141  3 7763 1            CAF    ONE
0103   REF  27 LAST 380      14,2142  54 337 1            TS     DSPTEM1
0104   REF   1               14,2143  3 3674 1            CAF    V01N30E          DISPLAY 00001 IN R1
0105   REF  33 LAST 380      14,2144  0 4657 1            TC     NVSBWAIT
0106   REF 136 LAST 381      14,2145  3 7767 0            CAF    ZERO             TO INDICATE GROUND MARKS
0107   REF  35 LAST 383      14,2146  0 5206 0            TC     BANKCALL
0108   REF   1               14,2147   27005 1           CADR   AOTMARK          MARK ON TARGET 1

0109   REF  36 LAST 383      14,2150  0 5206 0            TC     BANKCALL
0110   REF   1               14,2151   26747 1           CADR   OPTSTALL         INSURE SUCCESSFUL MARK
0111   REF   5 LAST 381      14,2152  1 2770 1            TCF    ENDTEST
0112                          14,2153  0 0006 1            EXTEND
0113   REF  39 LAST 167      14,2154  5 0373 0            INDEX  MARKSTAT
0114                          14,2155  3 0001 0            DCA    0
0115   REF   1               14,2156  53,565 1            DXCH   TMARK            TIME(PRES) FOR EARTH RATE COMPENSATION

0116   REF   1               14,2157  0 2242 1            TC     SIMANGS1

0117   REF   8 LAST 380      14,2160  0 6112 0            TC     INTPRET
0118                          14,2161   45140 0           EXC,1  CALL
0119   REF  40 LAST 383      14,2162   00373 0                  MARKSTAT         BASE ADDRESS VAC AREA FOR AOTNB
0120   REF   1               14,2163   33114 0                  AOTNB            OPTICS TO NAV BASE COORDINATE FRAME
0121                          14,2164   45014 0           BON    CALL
0122   REF   2 LAST 380      14,2165   00305 1                  COAROFIN         COARSE MARKS = 0    FINE MARKS = 1
0123                          14,2166   30170 1                  +2
0124   REF   3 LAST 356      14,2167   32555 0                  NBSM             NAV BASE DIRECT TO STABLE MEMBER
0125   REF  27 LAST 351      14,2170   02445 0           STORE  STARAD           TARGET 1 WRT NAV BASE OR STABLE MEMBER
0126   REF   1               14,2171   02601 1           STORE  LOS1             ...FOR K...
0127                          14,2172   77776 1           EXIT

0128   REF  37 LAST 383      14,2173  0 5206 0            TC     BANKCALL
0129   REF   2 LAST 383      14,2174   27046 0           CADR   MKRELEAS         RELEASE MARK SYSTEM
0130   REF  42 LAST 367      14,2175  3 7762 0            CAF    TWO
0131   REF  28 LAST 383      14,2176  54 337 1            TS     DSPTEM1
0132   REF   2 LAST 383      14,2177  3 3674 1            CAF    V01N30E          DISPLAY 00002 IN R1
0133   REF  34 LAST 383      14,2200  0 4657 1            TC     NVSBWAIT
0134   REF 107 LAST 383      14,2201  3 7767 0            CAF    ZERO             TO INDICATE GROUND MARKS
0135   REF  38 LAST 383      14,2202  0 5206 0            TC     BANKCALL
0136   REF   2 LAST 383      14,2203   27005 1           CADR   AOTMARK          MARK ON TARGET 2

0137   REF  31 LAST 378      14,2204  3 7752 0            CAF    BIT10
0138   REF  28 LAST 336      14,2205  7 0074 0            MASK   STATE            BIT10 = COAROFIN
0139   REF 205 LAST 377      14,2206  10 000 0            CCS    A
0140   REF   1               14,2207  1 2215 1            TCF    EARRTCOM +5      IF COARSE ALIGN MARKS
```

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```
0141  REF  39 LAST 383   14,2210  0 5206 0  EARRTCOM  TC      BANKCALL      EARTH RATE COMPENSATION BETWEEN MARKS
0142  REF   2 LAST 381   14,2211    30424 0            CADR    EARTHR
0143  REF   2 LAST  98   14,2212  10 370 1             CCS     OPTCADR       +0 IF MARK BUTTON NOT DEPRESSED
0144                     14,2213  1 2216 1             TCF     +3
0145  REF   2 LAST 383   14,2214  1 2210 1             TCF     EARRTCOM      CONTINUE TO COMPENSATE FOR EARTH RATE
0146                     14,2215  1 2216 1             TCF     +1
0147  REF  40 LAST 384   14,2216  0 5206 0             TC      BANKCALL
0148  REF   2 LAST 383   14,2217    26747 1            CADR    OPTSTALL      INSURE SUCCESSFUL MARK
0149  REF   6 LAST 383   14,2220  1 2770 1             TCF     ENDTEST

0150  REF   2 LAST 383   14,2221  0 2242 1             TC      GIMANGS1

0151  REF   9 LAST 383   14,2222  0 6112 0             TC      INTPRET
0152                     14,2223    45140 0           LXC,1   CALL
0153  REF  41 LAST 383   14,2224    00373 0                   MARKSTAT      BASE ADDRESS VAC AREA FOR AOTNB
0154  REF   2 LAST 383   14,2225    33114 0                   AOTNB         OPTICS TO NAV BASE COORDINATE FRAME
0155                     14,2226    45014 0           BONCLR  CALL          SET TO ZERO FOR FINE ALIGN MARKS
0156  REF   3 LAST 383   14,2227    00205 0                   COARSFIN      COARSE MARKS = 0    FINE MARKS = 1
0157                     14,2230    30232 1                   +2
0158  REF   4 LAST 383   14,2231    32555 0                   NBSM          NAV BASE DIRECT TO STABLE MEMBER
0159  REF  28 LAST 383   14,2232    02453 1           STORE   STARAD +6     TARGET 2 WRT NAV BASE OR STABLE MEMBER
0160  REF   1            14,2233    02607 1           STORE   LOS2          ...FOR K...

0161                     14,2234    77624 1  MATXDET  CALL
0162  REF   1            14,2235    30350 1                   TAR/EREF      TARGETS 1,2 WRT EARTH REF FRAME
0163                     14,2236    77624 1           CALL
0164  REF   1            14,2237    32741 1                   AXISGEN       NAV BASE OR SM WRT EARTH REF FRAME
0165                     14,2240    77776 1           EXIT
0166  REF   6 LAST 383   14,2241  0 1546 1             TC      UPLACE


0167  REF  43 LAST 383   14,2242  3 7762 0  GIMANGS1  CAF     TWO           BASE ADDRESS GIMBAL ANGLES FOR NBSM
0168  REF  42 LAST 384   14,2243  6 0373 0             AD      MARKSTAT
0169  REF   2 LAST 364   14,2244  50 110 1             INDEX   FIXLOC
0170  REF  10 LAST 356   14,2245  54 050 0             TS      S1
0171  REF 153 LAST 378   14,2246  0 0002 0             TC      Q
```

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```
0172                        14,2247  0 0006 1  PJTPOSX  EXTEND          COARSE ALIGNS STABLE MEMBER
0173  REF   7 LAST 384     14,2250  23'546 1            DXCH   DPLACE
0174  REF  10 LAST 384     14,2251  0 6112 0            TC     INTPRET
0175                        14,2252  77624 1             CALL
0176  REF   1               14,2253  32655 0                    CALCGA      CALCULATE COARSE ALIGN GIMBAL ANGLES
0177                        14,2254  77776 1             EXIT
0178  REF  41 LAST 384     14,2255  0 5206 0            TC     BANKCALL
0179  REF   2 LAST 204     14,2256  26065 0             CADR   IMJCOARS    COARSE ALIGN MODE
0180  REF  42 LAST 385     14,2257  0 5206 0            TC     BANKCALL
0181  REF   7 LAST 380     14,2260  26751 0             CADR   IMJSTALL
0182  REF   7 LAST 384     14,2261  1 2770 1            TCF    ENDTEST
0183  REF   8 LAST 385     14,2262  0 1546 1            TC     DPLACE

0184                        14,2263  0 0006 1  SMDCALC  EXTEND          FINE ALIGNS STABLE MEMBER
0185  REF   9 LAST 385     14,2264  23'546 1            DXCH   DPLACE
0186  REF  11 LAST 385     14,2265  0 6112 0            TC     INTPRET
0187                        14,2266  64375 1             VLOAD  MXV
0188  REF  19 LAST 382     14,2267  02401 0                    XSM         XSM DESIRED WRT EARTH REF FRAME
0189  REF  29 LAST 384     14,2270  02445 0                    STARAD      THEN TO SM PRESENT OR NAV BASE FRAME
0190                        14,2271  43172 1             VSL1   BOFF
0191  REF   4 LAST 384     14,2272  00345 0                    COARSFIN    BIT10 FOR LEMLAB TEST
0192                        14,2273  30276 1                    +3
0193                        14,2274  34041 0             STCALL 32D
0194  REF   5 LAST 384     14,2275  32555 0                    NBSM        THEN TO SM PRESENT FRAME
0195  REF  13 LAST 349     14,2276  26423 0             STOVL  XDC
0196  REF   5 LAST 350     14,2277  02407 0                    YSM         YSM DESIRED WRT EARTH REF FRAME
0197                        14,2300  76521 0             MXV    VSL1
0198  REF  30 LAST 385     14,2301  02445 0                    STARAD      THEN TO SM PRESENT OR NAV BASE FRAME
0199                        14,2302  77614 1             BOFF
0200  REF   5 LAST 385     14,2303  00345 0                    COARSFIN    BIT10 FOR LEMLAB TEST
0201                        14,2304  30307 0                    +3
0202                        14,2305  34041 0             STCALL 32D
0203  REF   6 LAST 385     14,2306  32555 0                    NBSM        THEN TO SM PRESENT FRAME
0204  REF   3 LAST 349     14,2307  26431 0             STOVL  YDC
0205  REF  14 LAST 385     14,2310  02423 0                    XDC
0206                        14,2311  76435 1             VXV    VSL1
0207  REF   4 LAST 385     14,2312  02431 0                    YDC
0208  REF   3 LAST 349     14,2313  36437 1             STCALL ZDC         ZSM DESIRED WRT SM PRESENT FRAME
0209  REF   1               14,2314  32425 0                    CALCGTA     CALCULATE FINE ALIGN TORQUING ANGLES
0210                        14,2315  47170 1             AXT,1  RTB
```

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```
0211  REF   7 LAST 347    14,2316   02500 0    ECADR   DGC          X1 = BASE ADDRESS OF TORQUING ANGLES
0212  REF   1             14,2317   33627 1               PULSFIMU  TO PUT OUT GYRO TORQUING PULSES
0213                      14,2320   77776 1    EXIT
0214  REF  43 LAST 385    14,2321   0 5206 0   TC      BANKCALL
0215  REF   8 LAST 385    14,2322    26751 0   CADR    IMUSTALL     WAIT FOR PULSES TO GET OUT
0216  REF   8 LAST 385    14,2323   1 2770 1   TCF     ENDTEST
0217  REF  10 LAST 385    14,2324   0 1546 1   TC      DPLACE
```

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0218                          14,2325   77776 1  MAKEXSMD EXIT                  XSM V   YSM SW   ZSM SE

0219   REF    1               14,2326   3 3703 0          CAF     17DEC         ZERO XSM, YSM, AND ZSM
0220   REF    1               14,2327   55'777 0          TS      ZERONDX
0221   REF    1               14,2330   3 3721 0          CAF     XSMADRX
0222   REF   44 LAST 386      14,2331   0 5206 0          TC      BANKCALL
0223   REF    1               14,2332    51245 0          CADR    ZEROING                    VERT        SOUTH       EAST

0224   REF    4 LAST 360      14,2333   3 7746 0          CAF     HALF          XSM     * +1          0           0       *
0225   REF   20 LAST 385      14,2334   55'400 0          TS      XSM           XSM     *                                 *
0226   REF   12 LAST 385      14,2335   0 6112 0          TC      INTPRET       XSM     *                                 *
0227                          14,2336    73545 1          DLOAD   SIN           YSM     *  0      +SIN(AZ)    +COS(AZ)   *
0228   REF    1               14,2337    02507 1                  AZIMUTH       XSM     *                                 *
0229   REF   21 LAST 387      14,2340    02411 1          STORE   XSM +8D       XSM     *                                 *
0230   REF   22 LAST 387      14,2341    16421 1          STODL   XSM +16D      ZSM     *  0      -COS(AZ)    +SIN(AZ)   *
0231   REF    2 LAST 387      14,2342    02507 1                  AZIMUTH
0232                          14,2343    77746 1          COS
0233   REF   23 LAST 387      14,2344    02413 0          STORE   XSM +10D
0234                          14,2345    77676 0          DCOMP
0235   REF   24 LAST 387      14,2346    02417 1          STORE   XSM +14D
0236                          14,2347    77616 0          RVQ


0237                          14,2350    77170 1  TAR/EREF AXT,1   AXT,2                      TARGET VECTOR
0238                          14,2351    00002 0                   2             SIN(EL)  -COS(AZ)COS(EL)  SIN(AZ)COS(EL)
0239                          14,2352    00014 1                   12D
0240                          14,2353    77731 1          SSP
0241   REF   12 LAST 358      14,2354    00052 0                   S2
0242                          14,2355    00006 1                   6             TARGET 1                        TARGET 2

0243                          14,2356    60533 1  TAR1     SLOAD*   SR2           X1=2  X2=12  S2=6 . X1=0  X2=6  S2=6
0244   REF    1               14,2357    02557 1                   TAZE 1 +3,1
0245                          14,2360    00001 0          STORE    0             PD00          ELEVATION          PD00
0246                          14,2361    77756 0          SIN
0247                          14,2362    10023 1          STORE    18D,2         PD06  ***      SIN(EL)      ***  PD12
02471                         14,2363    77745 1          DLOAD
0248                          14,2364    00001 0                   0
0249                          14,2365    41546 0          COS      PUSH          PD00          COS(EL)            PD00
0250                          14,2366    47133 0          SLOAD*   RTB
0251   REF    2 LAST 387      14,2367    02556 0                   TAZE 1 +2,1
0252   REF   12 LAST 359      14,2370    33457 1                   CDULOGIC
0253                          14,2371    00003 1          STORE    2             PD02          AZIMUTH            PD02
0254                          14,2372    41356 1          SIN      DMP
0255                          14,2373    00001 0                   0
0256                          14,2374    77752 1          SL1
0257                          14,2375    10027 0          STORE    22D,2         PD10  ***  +SIN(AZ)COS(EL)  ***  PD16
02571                         14,2376    77745 1          DLOAD
0258                          14,2377    00003 1                   2
0259                          14,2400    41346 0          COS      DMP
```

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```
0260                    14,2401  57552 1    SL1     DCOMP
0261                    14,2402  10025 1    STORE   20D,2      PD08  ***  -COS(AZ)COS(EL)  ***  PD14

0262                    14,2403  61170 0    AXT,1   TIX,2
0263                    14,2404  00000 1            0
0264  REF  1            14,2405  30356 1            TAR1
0265                    14,2406  77616 0    RVQ
```

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```
0266                          14,2407   65345 0  ERTHRVSE DLOAD   PDDL
0267   REF   4 LAST 357      14,2410   33105 0           ZERODP   PD24 = (SIN  -COS  0)(OMEG/MS)
0268   REF   1               14,2411   02511 0           LATITUDE
0269                          14,2412   57546 1           COS      DCOMP
0270                          14,2413   73525 1           PDDL     SIN
0271   REF   2 LAST 389      14,2414   02511 0           LATITUDE EARTH RATE = .1504 ARCSEC / 10 MSEC
0272                          14,2415   74266 0           VDEF     VXSC    1.618 GYRO PULSES = 1 ARCSEC
0273   REF   1               14,2416   31725 0           OMEG/MS  OMEG/MS = .243... GYRO PULSES / 10 MSEC
0274   REF   1               14,2417   02514 0           STORE    ERVECTOR

0275                          14,2420   77634 0           RTB
0276   REF   1               14,2421   33454 1           LOADTIME
0277   REF   2 LAST 383      14,2422   02565 0           STORE    TMARK   TIME FOR GYRO DRIFT - PIPA SCALE FACTOR
0278                          14,2423   77616 0           RVQ


0279   REF   5 LAST 289      14,2424   0 5235 0  EARTHR   TC       MAKECADR CALCULATES AND COMPENSATES EARTH RATE
0280   REF   1               14,2425   55,547 1          TS       OPLACES

0281   REF   5 LAST 327      14,2426   0 4133 1          TC       CHECKMM  TEST FOR MAJOR MODE 4
02813                         14,2427    00004 0          OCT      4        IS PRELAUNCH OVER ?
02815  REF   1               14,2430   1 2440 1          TCF      GETPLTIM NO
02817                         14,2431   0 0004 0          INHINT             YES,
0282   REF  28 LAST 377      14,2432   3 7763 1          CA       BIT1     SET UP MP2TASK NOW
02823  REF  58 LAST 382      14,2433   0 5663 1          TC       WAITLIST
02825  REF   7 LAST  69                     E3           EBANK=   TGRR
02827                         14,2434   02003 0          2CADR    MP2TASK
C02827 REF   1               14,2435    56063 1
02828  REF   1               14,2436   3 2476 0          CA       3,27CADR SET UP RETURN TO BYPASS PRELAUNCH
02829  REF   2 LAST 389      14,2437   55,547 1          TS       OPLACES

0283                          14,2440   0 0006 1  GETPLTIM EXTEND             GET CURRENT TIME
02833  REF  16 LAST 360      14,2441   3 0025 0          QCA      TIME2
02835  REF 228 LAST 381      14,2442   52 145 0          QXCH     MPAC
028351                        14,2443   0 0006 1          EXTEND
028352 REF 229 LAST 389      14,2444   3 0145 1          QCA      MPAC
02836  REF   1               14,2445   53,562 0          QXCH     TEMPTIME STORE IN TEMPTIME BEFORE RELINT
02837                         14,2446   0 0003 1          RELINT

028374 REF 108 LAST 383      14,2447   3 7767 0          CAF      ZERO     DECLARE DP MODE.
028376 REF   1               14,2450   54 153 1          TS       MODE
02838  REF  13 LAST 387      14,2451   0 6112 0          TC       INTPRET
0285                          14,2452    54225 0          QSU      SL
0286   REF   3 LAST 389      14,2453   02565 0                    TMARK    T(PRES) - T(PREV) = DT    SCALED 10 MSEC
0287                          14,2454   20212 1                    9D       2 TO 21ST POWER = 1 REVOLUTION
0288                          14,2455   64361 1           VXSC     MXV
0289   REF   2 LAST 389      14,2456   02514 0                    ERVECTOR VT = (SIN  -COS  0)(OMEG/MS)(DT)
```

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```
0290   REF  25 LAST 387    14,2457   02401 0                    XSM       (XSM)(VT) = EARTH RATE COMPENSATION
0291                       14,2460   77655 1            VAD
0292   REF   1             14,2461   02772 1                    ERCOMP
0293   REF   2 LAST 390    14,2462   16772 1            STODL   ERCOMP
0294   REF   2 LAST 389    14,2463   02562 1                    TEMPTIME
0295   REF   4 LAST 389    14,2464   02565 0            STORE   TMARK     T(PREVIOUS)

0296                       14,2465   47170 1            AXT,1   RTB
0297   REF   3 LAST 390    14,2466   02771 1            ECADR   ERCOMP
0298   REF   2 LAST 386    14,2467   33627 1                    PULSEIMU  TO PUT OUT GYRO TORQUING PULSES
0299                       14,2470   77776 1            EXIT

0300   REF  45 LAST 387    14,2471   0 5206 0           TC      BANKCALL
0301   REF   9 LAST 386    14,2472    26751 0           CADR    IMUSTALL  WAIT FOR PULSES TO GET OUT
0302   REF   9 LAST 386    14,2473   1 2770 1           TCF     ENDTEST
0303   REF   3 LAST 389    14,2474   31,547 0           CAE     QPLACES
0304   REF  12 LAST 307    14,2475   1 5230 1           TCF     BANKJUMP

03045  REF   2 LAST  66    14,2476    72651 0  3,27CADR CADR    REDO3,27


0305                       14,2477   0 0006 1  STORRSLT EXTEND
0306   REF  11 LAST 386    14,2500   23,546 1           QXCH    QPLACE

0307   REF  14 LAST 389    14,2501   0 6112 0           TC      INTPRET   DP TIME IN MPAC SCALED .312(5) MSEC
0308                       14,2502    54340 1           LXC,1   SL
0309   REF   2 LAST 381    14,2503    02537 1                   NDXCTR
0310                       14,2504    20204 0                   3
0311                       14,2505    47005 1           DMP     RTB
0312   REF   1             14,2506    31723 0                   SCALETR
0313   REF   2 LAST 226    14,2507    33520 0                   SGNAGREE
0314   REF  29 LAST  46    14,2510    06571 1           STORE   GENPL,1   STORE DP TIME
0315                       14,2511    77776 1           EXIT

0316   REF   2 LAST 381    14,2512    57,551 1          XCH     STOREPL   CONTAINS C(PIPAI)
0317   REF   3 LAST 390    14,2513    51,537 1          INDEX   NDXCTR
0318   REF  30 LAST 390    14,2514    55,572 1          TS      GENPL +2  STORE PIPA COUNTER READING
0319   REF   4 LAST 390    14,2515    4 1537 0          CS      NDXCTR
0320   REF   1             14,2516    6 3707 1          AD      72DEC
0321                       14,2517    0 0006 1          EXTEND
0322   REF   1             14,2520    6 3146 1          BZMF    MISALIGN  TO CALCULATE MISALIGNMENT
0323   REF  17 LAST 379    14,2521    3 6311 1          CAF     THREE
0324   REF   5 LAST 390    14,2522    27,537 0          ADS     NDXCTR
0325   REF  12 LAST 390    14,2523    0 1546 1          TC      QPLACE

0326                       14,2524    0 0006 1  OPTDATA EXTEND
0327   REF  13 LAST 390    14,2525    23,546 1          QXCH    QPLACE    CALLS FOR AZIMUTH AND ELEVATION OF
                                                                          TARGET 1, THEN TARGET 2

0328   REF  29 LAST 389    14,2526    3 7763 1          CAF     BIT1      AZIMUTH CLOCKWISE FROM NORTH TO TARGET
```

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```
0329                        14,2527  22 007 0          ZL        ELEVATION MEASURED FROM HORIZONTAL
0330  REF   1               14,2530  23'550 0          LXCH  RUN
0331  REF  29 LAST 383      14,2531  54 341 0          TS    DSPTEM1 +2
0332  REF   1               14,2532  3 3675 0          CAF   V05N09E     DISPLAY TARGET NUMBER IN R3
0333  REF  35 LAST 383      14,2533  0 4657 1          TC    NVSBWAIT
0334  REF   2 LAST 391      14,2534  51'550 0          INDEX RUN
0335  REF   3 LAST 387      14,2535  53'554 0          DXCH  TAZEL1
0336  REF  30 LAST 391      14,2536  52 340 1          DXCH  DSPTEM1

0337  REF   1               14,2537  0 2577 0          TC    CHECKLD     R1  +- XXX.XX   AZIMUTH IN DEGREES
0338                        14,2540   00661 0          DCT   00661       R2  +- XX.XXX   ELEVATION IN DEGREES
0339  REF  10 LAST 390      14,2541  1 2770 1          TCF   ENDTEST      R3      0000X   TARGET NUMBER 1 OR 2

0340  REF  31 LAST 391      14,2542  52 340 1          DXCH  DSPTEM1     TAZEL1        TARGET 1 AZIMUTH
0341  REF   3 LAST 391      14,2543  51'550 0          INDEX RUN
0342  REF   4 LAST 391      14,2544  53'554 0          DXCH  TAZEL1      TAZEL1 +2     TARGET 2 AZIMUTH
0343  REF   4 LAST 391      14,2545  11'550 1          CCS   RUN
0344                        14,2546  1 2552 0          TCF   +4
0345  REF  44 LAST 384      14,2547  3 7762 0  OPTRDRIN CAF   TWO         SPECIAL ENTRY FOR RNR37511
0346  REF  77 LAST 366      14,2550  54 001 1          TS    L
0347  REF   2 LAST 380      14,2551  1 2530 1          TCF   OPTDATA +4    MPAC    1ST PASS = 0    2ND PASS = 2
0348  REF  14 LAST 390      14,2552  0 1546 1          TC    OPLACE
```

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```
0349                        14,2553   62545 1  LATAZCHK DLOAD   SL2          CALLS FOR AZIMUTH (SM) AND LATITUDE
0350  REF   3 LAST 389     14,2554   02511 0           DLOAD   LATITUDE
0351  REF  32 LAST 391     14,2555   14341 1           STODL   DSPTEM1 +1
0352  REF   3 LAST 387     14,2556   02507 1           DLOAD   AZIMUTH      ...NOT REALLY...

0353                        14,2557   77434 1           RTB     EXIT
0354  REF   1               14,2560   33522 1           DLOAD   1STO2S       FRACTION OF REVOLUTION TO 2S COMPLEMENT

0355  REF 230 LAST 389      14,2561   56 144 0          XCH     MPAC         AZIMUTH MUST BE 135 DEGREES  R1 = +13500
0356  REF  33 LAST 392      14,2562   54 337 1          STO     DSPTEM1        FOR SXT-NB-IMU FINE ALIGNMENT TEST
0357  REF   2 LAST 391      14,2563   0 2577 0          TC      CHECKLD      R1  +- XXX.XX    AZIMUTH IN DEGREES (SM)
0358                        14,2564    00661 0          OCT     00661        R2  +- XX.XXX    LATITUDE IN DEGREES
0359  REF  11 LAST 391      14,2565   1 2770 1          TCF     ENDTEST      R3               NOT USED

0360  REF  15 LAST 390      14,2566   0 6112 0          TC      INTPRET
0361                        14,2567   47135 0           SLOAD   RTB
0362  REF  34 LAST 392      14,2570   00340 0           STO     DSPTEM1
0363  REF  13 LAST 387      14,2571   33457 1           CDULOGIC                 BACK TO FRACTION OF REVOLUTION
0364  REF   4 LAST 392      14,2572   02507 1           STORE   AZIMUTH

0365                        14,2573   60535 1           SLOAD   SR2
0366  REF  35 LAST 392      14,2574   00341 1           STO     DSPTEM1 +1
0367  REF   4 LAST 392      14,2575   02511 0           STORE   LATITUDE
0368                        14,2576   77616 0           RVQ


0369                        14,2577   0 0006 1  CHECKLD  EXTEND
0370  REF   1               14,2600   23'545 1          QXCH    QPLAC

0371  REF   2 LAST 392      14,2601   51'545 1          INDEX   QPLAC
0372  REF 206 LAST 383      14,2602   3 0000 1          CA      A
0373  REF   4 LAST 307      14,2603   0 4444 1          TC      NVSUB
0374  REF   1               14,2604   1 2616 0          TCF     CHECKLD1

0375  REF   7 LAST 375      14,2605   0 4622 0          TC      FLASHON

0376  REF  25 LAST 380      14,2606   0 4475 0          TC      ENDIDLE      CHANGE R1  V21 N61 E  +- XXX.XX E
0377                        14,2607   1 2612 1          TCF     +3           CHANGE R2  V22 N61 E  +- XX.XXX E
0378                        14,2610   1 2614 1          TCF     +4           VERIFY, THEN PROCEED WITH VERB 33 ENTER
0379  REF   3 LAST 392      14,2611   1 2601 0          TCF     CHECKLD +2
0380  REF   3 LAST 392      14,2612   51'545 1          INDEX   QPLAC
0381                        14,2613   0 0001 0          TC      1
0382  REF   4 LAST 392      14,2614   51'545 1          INDEX   QPLAC
0383                        14,2615   0 0002 0          TC      2

0384  REF   1               14,2616   3 2620 1  CHECKLD1 CAF     CHECKLD2
0385  REF   3 LAST 307      14,2617   0 4654 1          TC      NVSUBUSY
0386  REF   4 LAST 392      14,2620    30601 0  CHECKLD2 CADR    CHECKLD +2
```

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```
0387                        14,2621  0 0006 1  POSNJUMP EXTEND          POSITIONS FOR SXTNBIMU
0388  REF  15 LAST 391      14,2622  23'546 1           DXCH   DPLACE

0389  REF   2 LAST 380      14,2623  51'544 0           INDEX  POSITON
0390                        14,2624  1 2625 0           TCF    +1
0391  REF  12 LAST 392      14,2625  1 2770 1           TCF    ENDTEST
0392  REF   1               14,2626  1 2633 1           TCF    POS1
0393  REF   1               14,2627  1 2640 0           TCF    POS2
0394  REF   1               14,2630  1 2656 1           TCF    POS3
0395  REF   1               14,2631  1 2677 1           TCF    POS4
0396  REF   1               14,2632  1 2731 1           TCF    POS5


0397  REF  39 LAST 383      14,2633  3 7763 1  POS1     CAF    ONE          XSM = V    YSM = SW   ZSM = SE
0398  REF   3 LAST 382      14,2634  55'542 1           TS     PIPNDX
0399  REF  45 LAST 391      14,2635  3 7762 0           CAF    TWO
0400  REF   4 LAST 393      14,2636  55'543 0           TS     PIPNDX +1    MONITOR PIPAY AND PIPAZ
0401  REF  16 LAST 393      14,2637  0 1546 1           TC     DPLACE


0402  REF  16 LAST 392      14,2640  0 6112 0  POS2     TC     INTPRET      XSM = SE   YSM = SW   ZSM = V
0403                        14,2641   57575 1           VLOAD  VCOMP
0404  REF  26 LAST 390      14,2642   02401 0                  XSM
0405                        14,2643   77715 1           PDVL
0406  REF   3 LAST 351      14,2644   02415 0                  ZSM
0407  REF  27 LAST 393      14,2645   26401 0           STODL  XSM
0408                        14,2646   77626 0           STADR
0409  REF   4 LAST 393      14,2647   75362 1           STORE  ZSM
0410                        14,2650   77776 1           EXIT
0411  REF 139 LAST 389      14,2651  3 7767 0           CAF    ZERO
0412  REF   5 LAST 393      14,2652  55'542 1           TS     PIPNDX
0413  REF 130 LAST 393      14,2653  3 7763 1           CAF    ONE
0414  REF   6 LAST 393      14,2654  55'543 0           TS     PIPNDX +1    MONITOR PIPAX AND PIPAY
0415  REF  17 LAST 393      14,2655  0 1546 1           TC     DPLACE


0416  REF  17 LAST 393      14,2656  0 6112 0  POS3     TC     INTPRET      XSM = SE   YSM = V    ZSM = SW
0417                        14,2657   63375 0           VLOAD  PDVL
0418  REF  28 LAST 393      14,2660   02401 0                  XSM
0419  REF   6 LAST 385      14,2661   02407 0                  YSM
0420                        14,2662   77715 1           PDVL
0421  REF   5 LAST 393      14,2663   02415 0                  ZSM
0422  REF  29 LAST 393      14,2664   26401 0           STODL  XSM

0423                        14,2665   77626 0           STADR
0424  REF   6 LAST 393      14,2666   51362 1           STODL  ZSM
```

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```
0425                        14,2667   77626 0          STADR
0426  REF   7 LAST 393     14,2670   75370 1          STORE   YSM
0427                        14,2671   77776 1          EXIT
0428  REF 110 LAST 393     14,2672   3 7767 0         CAF     ZERO
0429  REF   7 LAST 393     14,2673   55,542 1         TS      PIPADX
0430  REF  46 LAST 393     14,2674   3 7762 0         CAF     TWO
0431  REF   8 LAST 394     14,2675   55,543 0         TS      PIPADX +1       MONITOR PIPAX AND PIPAZ
0432  REF  18 LAST 393     14,2676   0 1546 1         TC      QPLACE


0433  REF  15 LAST 322     14,2677   3 7757 0  P05A   CAF     BIT5            OPTION TO ALIGN SM TO SPECIFIED ANGLES
0434  REF   3 LAST 384     14,2700   6 0110 1         AD      FIXLOC
0435  REF   4 LAST 394     14,2701   50 110 1         INDEX   FIXLOC
0436  REF  11 LAST 384     14,2702   54 050 0         TS      S1              BASE ADDRESS GIMBAL ANGLES
0437  REF   1              14,2703   3 3701 1         CAF     V25N22E         R1  +- XXX.XX   OUTER GIMBAL ANGLE
0438  REF  36 LAST 391     14,2704   0 4657 1         TC      NVSBWAIT        R2  +- XXX.XX   INNER GIMBAL ANGLE
0439  REF  26 LAST 392     14,2705   0 4475 0         TC      ENDIDLE         R3  +- XXX.XX   MIDDLE GIMBAL ANGLE
0440  REF  13 LAST 393     14,2706   1 2770 1         TCF     ENDTEST
0441                        14,2707   1 2703 0         TCF     -4
0442  REF   8 LAST 363     14,2710   3 0400 0         CA      THETAD          SET UP ANGLES FOR SMNB
0443  REF   5 LAST 394     14,2711   50 110 1         INDEX   FIXLOC
0444                        14,2712   54 024 0         TS      24
0445  REF   9 LAST 394     14,2713   3 0401 1         CA      THETAD +1
0446  REF   6 LAST 394     14,2714   50 110 1         INDEX   FIXLOC
0447                        14,2715   54 020 1         TS      20
0448  REF  10 LAST 394     14,2716   3 0402 1         CA      THETAD +2
0449  REF   7 LAST 394     14,2717   50 110 1         INDEX   FIXLOC
0450                        14,2720   54 022 0         TS      22

0451  REF  18 LAST 393     14,2721   0 6112 0         TC      INTPRET
0452                        14,2722   45034 1          RTB     CALL
0453  REF   1              14,2723   33031 0                  TRANSPSE        EARTH REF WRT NAV BASE
0454  REF   1              14,2724   33043 0                  SMD/EREF        STABLE MEMBER DESIRED WRT EARTH REF
0455                        14,2725   77634 0          RTB
0456  REF   2 LAST 394     14,2726   33031 0                  TRANSPSE        BACK TO NAV BASE WRT TO EARTH REF
0457                        14,2727   77776 1          EXIT
0458  REF  19 LAST 394     14,2730   0 1546 1         TC      QPLACE
```

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```
0459  REF  20 LAST 394   14,2731  3 1546 1  PDSS   CA     OPLACE    OPTION TO ALIGN SM TO ANY ORIENTATION
0460  REF   3 LAST 390   14,2732  55'551 0         TS     STORFPL     WRT EARTH REFERENCE FRAME

0461  REF   3 LAST 391   14,2733  0 2524 0         TC     OPTDATA   LOAD YSM AND ZSM AZIMUTH AND ELEVATION

0462  REF  19 LAST 394   14,2734  0 6112 0         TC     INTPRET
0463                     14,2735   77624 1         CALL
0464  REF   2 LAST 384   14,2736   30350 1                TAR/EREF  CALC YSM AND ZSM WRT EARTH REF. FRAME
0465                     14,2737   41575 0         VLOAD  PUSH
0466                     14,2740   00007 0                6D
0467  REF   8 LAST 394   14,2741   02407 0         STORE  YSM
0468                     14,2742   76435 1         VXV    VSL1
0469                     14,2743   00015 0                12D
0470  REF  30 LAST 393   14,2744   02401 0         STORE  XSM       XSM = (YSM) X (ZSM)
0471                     14,2745   76435 1         VXV    VSL1
0472                     14,2746   77626 0         STADR
0473  REF   7 LAST 393   14,2747   75362 1         STORE  ZSM       ZSM = (XSM) X (YSM)
0474                     14,2750   77776 1         EXIT

0475  REF   4 LAST 395   14,2751  0 1551 1         TC     STORFPL
```

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```
0476                        14,2752  0 0006 1  DGCZERO   EXTEND                ZERO EARTH RATE TORQUING ANGLES
0477   REF  21 LAST 395     14,2753  23546 1             DXCH    DPLACE
0478   REF  20 LAST 395     14,2754  0 6112 0            TC      INTPRET
0479                        14,2755  77775 1             VLOAD
0480   REF   5 LAST 389     14,2756  33105 0                     ZERODP        VECTOR IN THIS CASE
0481   REF   4 LAST 390     14,2757  02772 1             STORE   ERCOMP
0482                        14,2760  77776 1             EXIT
0483   REF  22 LAST 396     14,2761  0 1546 1            TC      DPLACE

0484   REF  23 LAST 322     14,2762  3 7756 1  GMLCKCHK  CAF     BIT6          CHECK FOR GIMBAL LOCK  (MGA GREATER 70)
0485   REF  45 LAST 333     14,2763  7 0326 1            MASK    DSPTAB +11D
0486                        14,2764  0 0006 1            EXTEND
0487                        14,2765  1 2767 1            BZF     +2
0488   REF  14 LAST 394     14,2766  1 2770 1            TCF     ENDTEST
0489   REF 154 LAST 384     14,2767  0 0002 0            TC      Q

0490   REF   7 LAST 138     14,2770  3 7754 0  ENDTEST   CA      IMUSEFLG      BIT8
0491   REF   4 LAST 177     14,2771  6 7755 1            AD      RRUSEFLG      BIT7
0492   REF 207 LAST 392     14,2772  4 0000 0            CS      A
0493                        14,2773  0 0004 0            INHINT
0494   REF  29 LAST 383     14,2774  7 0074 0            MASK    STATE
0495   REF  30 LAST 396     14,2775  54 074 0            TS      STATE
0496   REF   8 LAST 327     14,2776  0 4117 1            TC      NEWMODEX
0497                        14,2777  00000 1             OCT     00000
0498   REF  46 LAST 390     14,3000  0 5206 0            TC      BANKCALL
0499   REF   3 LAST 383     14,3001  27046 0             CADR    MKRELEAS      RELEASE MARK SYSTEM
0500   REF  13 LAST 376     14,3002  0 5566 1            TC      EJFREE
```

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```
0501  REF  21 LAST 396   14,3003  0 6112 0  LEMLAB   TC      INTPRET
0502                     14,3004    57575 1           VLOAD   VCOMP
0503  REF   2 LAST 350   14,3005    33101 1                   YUNIT

0504  REF   2 LAST 346   14,3006    02437 0           STORE   ZNB          XNB MATRIX USED IN CALCGA
0505  REF  31 LAST 385   14,3007    26461 0           STOVL   STARAD +12D  STARAD MATRIX USED IN AXISGEN * SMDCALC
0506  REF   2 LAST 350   14,3010    33103 0                   XUNIT

0507  REF   4 LAST 346   14,3011    02423 0           STORE   XNB          *XNB*   *1    0    0* *V*
0508  REF  32 LAST 397   14,3012    26445 0           STOVL   STARAD       *   *   *              * * *
0509  REF   2 LAST 350   14,3013    33077 1                   ZUNIT        *YNB* = *0    0    1* *S*
0510  REF   2 LAST 346   14,3014    02431 0           STORE   YNB          *   *   *              * * *
0511  REF  33 LAST 397   14,3015    02453 1           STORE   STARAD +6    *ZNB*   *0   -1    0* *E*
0512                     14,3016    77776 1           EXIT

0513  REF   3 LAST 393   14,3017  4 1544 1           CS      POSITON
0514  REF  18 LAST 390   14,3020  6 6311 1           AD      THREE
0515                     14,3021  0 0006 1           EXTEND
0516                     14,3022  1 3024 0           BZF     +2
0517  REF   1            14,3023  1 3037 1           TCF     LEMLAB1

0518  REF  22 LAST 397   14,3024  0 6112 0           TC      INTPRET
0519                     14,3025    57575 1           VLOAD   VCOMP
0520  REF   5 LAST 397   14,3026    02423 0                   XNB
0521                     14,3027    77715 1           PDVL                 *XNB*   * 0   -1    0* *V*
0522  REF   3 LAST 397   14,3030    02437 0           STORE   ZNB          *   *   *              * * *
0523  REF   6 LAST 397   14,3031    02423 0           STORE   XNB          *YNB* = * 0    0    1* *S*
0524  REF  34 LAST 397   14,3032    26445 0           STOVL   STARAD       *   *   *              * * *
0525                     14,3033    77626 0           STADR                *ZNB*   *-1   0    0* * *
0526  REF   4 LAST 397   14,3034    75340 1           STORE   ZNB
0527  REF  35 LAST 397   14,3035    02461 0           STORE   STARAD +12D
0528                     14,3036    77776 1           EXIT

0529  REF  47 LAST 396   14,3037  0 5206 0  LEMLAB1  TC      BANKCALL
0530  REF  10 LAST 390   14,3040    26751 0           CADR    IMUSTALL     INSURE IMUZERO COMPLETION

0531  REF  15 LAST 396   14,3041  1 2770 1           TCF     ENDTEST

0532  REF   2 LAST 380   14,3042  0 2621 0           TC      POSNJUMP     SET UP STABLE MEMBER DESIRED COORDINATES
0533  REF  10 LAST 381   14,3043  0 4724 1           TC      FREEDSP      FREE DISPLAY SYSTEM
0534  REF   2 LAST 380   14,3044  0 2247 1           TC      PUTPOSX      TO COARSE ALIGN STABLE MEMBER

0535  REF   2 LAST 380   14,3045  0 2762 0           TC      GMLCKCHK

0536  REF  48 LAST 397   14,3046  0 5206 0           TC      BANKCALL
0537  REF   3 LAST 380   14,3047    26252 0           CADR    IMUFINE      FINE ALIGN MODE
0538  REF  49 LAST 397   14,3050  0 5206 0           TC      BANKCALL
0539  REF  11 LAST 397   14,3051    26751 0           CADR    IMUSTALL
0540  REF  16 LAST 397   14,3052  1 2770 1           TCF     ENDTEST
```

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```
0541  REF  12 LAST 360   14,3053  3 0032 0    CA     CDUX
0542  REF   8 LAST 394   14,3054  50 110 1    INDEX  FIXLOC
0543                     14,3055  54 024 0    TS     24
0544  REF  10 LAST 360   14,3056  3 0033 1    CA     CDUY
0545  REF   9 LAST 398   14,3057  50 110 1    INDEX  FIXLOC
0546                     14,3060  54 020 1    TS     20
0547  REF   8 LAST 360   14,3061  3 0034 0    CA     CDUZ
0548  REF  10 LAST 398   14,3062  50 110 1    INDEX  FIXLOC
0549                     14,3063  54 022 0    TS     22

0550  REF  16 LAST 394   14,3064  3 7757 0    CAF    BIT5
0551  REF  11 LAST 398   14,3065  6 0110 1    AD     FIXLOC
0552  REF  12 LAST 398   14,3066  50 110 1    INDEX  FIXLOC
0553  REF  12 LAST 394   14,3067  54 050 0    TS     S1

0554  REF   2 LAST 381   14,3070  0 2263 1    TC     SMDCALC        TO FINE ALIGN STABLE MEMBER

0555  REF  23 LAST 397   14,3071  0 6112 0    TC     INTPRET        IF EARTH RATE COMPENSATION DESIRED
0556                     14,3072   77634 0    RTB
0557  REF   2 LAST 389   14,3073   33454 1           LOADTIME
0558  REF   5 LAST 390   14,3074   02565 0    STORE  TMARK
0559                     14,3075   77776 1    EXIT

0560  REF   4 LAST 381   14,3076  4 1512 1    CS     ERDPTN
0561  REF  47 LAST 394   14,3077  6 7762 0    AD     TWO
0562                     14,3100  0 0006 1    EXTEND
0563                     14,3101  1 3103 1    BZF    +2

0564  REF   3 LAST 381   14,3102  1 2051 0    TCF    ERFINAL +2

0565  REF  50 LAST 397   14,3103  0 5206 0    TC     BANKCALL
0566  REF   1            14,3104   47236 0    CADR   SAMODRTN       RETURN TO SEMI-AUTOMATIC MODING TEST
```

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```
0567  REF   1              14,3105  3 3717 0  RDR37511 CAF    RDRRETN      RENDEZVOUS RADAR AND ANTENNA TRACKING
0568  REF  23 LAST 396     14,3106  55'546 0           TS     OPLACE       TO RETURN FROM OPTDATA

0569  REF  51 LAST 398     14,3107  0 5206 0           TC     BANKCALL
0570  REF   2 LAST 203     14,3110   20250 1           CADR   RRZERO

0571  REF  52 LAST 399     14,3111  0 5206 0           TC     BANKCALL
0572  REF   2 LAST 207     14,3112   22760 0           CADR   AURLOKON      OPERATOR DECISION TO LOCK ON OR NOT

0573  REF   1              14,3113  1 2547 1  RDR1     TCF    OPTRDRIN     CALL FOR AZIMUTH AND ELEVATION

0574  REF  53 LAST 399     14,3114  0 5206 0           TC     BANKCALL
0575  REF   3 LAST 203     14,3115   26745 0           CADR   RADSTALL
0576  REF  51 LAST 324     14,3116  1 5567 1           TCF    ENDOFJOB

0577  REF  24 LAST 398     14,3117  0 6112 0           TC     INTPRET
0578                       14,3120   77170 1           AXT,1  AXT,2        SET UP X1 AND X2 FOR TAR/EREF
0579                       14,3121   00000 1                  0
0580                       14,3122   00006 1                  6
0581                       14,3123   77624 1           CALL
0582  REF   3 LAST 395     14,3124   30353 1                  TAR/EREF +3  LINE-OF-SIGHT WRT EARTH REF FRAME
0583                       14,3125   64375 1           VLOAD  MXV
0584                       14,3126   00015 0                  12D          LINE-OF-SIGHT WRT EARTH REF FRAME
0585  REF  31 LAST 395     14,3127   02401 0                  XSM          TO STABLE MEMBER PRESENT FRAME
0586                       14,3130   77772 0           VSL1
0587  REF   4 LAST 183     14,3131   34415 0           STCALL RRTARGET
0588  REF   1              14,3132   20307 1                  RRDESSM

0589  REF   1              14,3133  1 3140 0           TCF    37511ALM
0590  REF  54 LAST 399     14,3134  0 5206 0           TC     BANKCALL
0591  REF   4 LAST 399     14,3135   26745 0           CADR   RADSTALL
0592  REF  52 LAST 399     14,3136  1 5567 1           TCF    ENDOFJOB
0593  REF  53 LAST 399     14,3137  1 5567 1           TCF    ENDOFJOB

0594  REF  33 LAST 370     14,3140  0 4755 1  37511ALM TC     ALARM
0595                       14,3141   00524 1           OCT    524
0596  REF  54 LAST 399     14,3142  1 5567 1           TCF    ENDOFJOB

0597  REF 111 LAST 394     14,3143  4 7767 1  RDRINIT  CS     ZERO
0598  REF   5 LAST 398     14,3144  55'512 1           TS     ERDPTN
0599  REF   2 LAST 210     14,3145  1 2002 0           TCF    AOTNBIMU +2
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```
0600  REF  14 LAST 375   14,3146  0 4644 0  MISALIGN TC     GRABWAIT        DISPLAY SYSTEM WAS FREED
0601  REF 112 LAST 399   14,3147  3 7767 0            CAF    ZERO
0602  REF   6 LAST 390   14,3150  55'537 0            TS     NDXCTR
0603  REF   7 LAST 400   14,3151  51'537 1  BBBB      INDEX  NDXCTR
0604  REF  31 LAST 390   14,3152  4 1674 1            CS     GENPL +68D
0605  REF   8 LAST 400   14,3153  51'537 1            INDEX  NDXCTR
0606  REF  32 LAST 400   14,3154  27'702 1            ADS    GENPL +74D
0607  REF   1            14,3155  3 3705 0            CAF    63DEC
0608  REF   9 LAST 400   14,3156  6 1537 1            AD     NDXCTR
0609  REF 208 LAST 396   14,3157  10 000 0            CCS    A
0610  REF  19 LAST 397   14,3160  4 6311 0            CS     THREE
0611  REF  10 LAST 400   14,3161  27'537 0            ADS    NDXCTR
0612  REF   1            14,3162  1 3151 0            TCF    BBBB
0613  REF  11 LAST 400   14,3163  55'537 0            TS     NDXCTR


0614  REF  25 LAST 399   14,3164  0 6112 0  CCCC      TC     INTPRET
0615                     14,3165  70750 1             LXA,1  DLOAD*
0616  REF  12 LAST 400   14,3166  02537 1                    NDXCTR
0617  REF  33 LAST 400   14,3167  02701 0                    GENPL +72D,1
0618                     14,3170  77625 0            DSU
0619  REF  34 LAST 400   14,3171  02571 0                    GENPL
0620  REF  35 LAST 400   14,3172  06701 1            STORE  GENPL +72D,1
0621                     14,3173  77776 1            EXIT
0622  REF  13 LAST 400   14,3174  4 1537 0            CS     NDXCTR
0623  REF   1            14,3175  6 3706 0            AD     69DEC
0624  REF 209 LAST 400   14,3176  10 000 0            CCS    A
0625  REF  20 LAST 400   14,3177  3 6311 1            CAF    THREE
0626  REF  14 LAST 400   14,3200  27'537 0            ADS    NDXCTR
0627  REF   1            14,3201  1 3164 0            TCF    CCCC
0628  REF   5 LAST 391   14,3202  55'550 1            TS     RUN
0629  REF  21 LAST 400   14,3203  3 6311 1            CAF    THREE
0630  REF  15 LAST 400   14,3204  55'537 0            TS     NDXCTR


0631  REF  26 LAST 400   14,3205  0 6112 0  DDDD      TC     INTPRET
0632                     14,3206  77775 1             VLOAD
0633  REF   6 LAST 396   14,3207  33105 0                    ZEROOP
0634                     14,3210  00031 0            STORE  24D
0635                     14,3211  00037 0            STORE  30D
0636                     14,3212  77735 0            SLOAD
0637  REF   1            14,3213  31703 1                    11DEC
0638                     14,3214  00041 1            STORE  32D
0639                     14,3215  77776 1            EXIT

0640  REF  27 LAST 400   14,3216  0 6112 0  DDDD1     TC     INTPRET
0641                     14,3217  70750 1             LXA,1  DLOAD*
0642  REF  16 LAST 400   14,3220  02537 1                    NDXCTR
```

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```
0643  REF  36 LAST 400   14,3221  02701 0            GENPI +72D,1
0644                     14,3222  41423 1      DSJ*  PUSH
0645  REF  37 LAST 401   14,3223  02673 1            GENPI +66D,1
0646                     14,3224  42742 0      SR1   DAD*
0647  REF  38 LAST 401   14,3225  02673 1            GENPI +66D,1
0648  REF  39 LAST 401   14,3226  06701 1      STORE GENPI +72D,1

0649                     14,3227  43312 0      SL2   DAD
0650                     14,3230  00031 0            24D
0651                     14,3231  20031 1      STODL* 24D
0652  REF  40 LAST 401   14,3232  02701 0            GENPI +72D,1
0653                     14,3233  63412 0      SL4   DSQ
0654                     14,3234  77615 0      DAD
0655                     14,3235  00033 1            26D
0656                     14,3236  00033 1      STORE 26D
0657                     14,3237  77776 1      EXIT
0658  REF   6 LAST 400   14,3240  31'550 0     CAE   RUN
0659  REF  17 LAST 400   14,3241  6 1537 1     AD    NDXCTR
0660                     14,3242  4 0000 0     COM
0661  REF   2 LAST 400   14,3243  6 3705 0     AD    63DEC
0662  REF 210 LAST 400   14,3244  10 000 0     CCS   A
0663  REF   9 LAST 273   14,3245  3 6306 1     CAF   SIX
0664  REF  18 LAST 401   14,3246  27'537 0     ADS   NDXCTR
0665  REF   1            14,3247  1 3216 0     TCF   DDDD1
0666  REF   7 LAST 401   14,3250  6 1550 0     AD    RUN
0667  REF  19 LAST 401   14,3251  55'537 0     TS    NDXCTR


0668  REF  28 LAST 400   14,3252  0 6112 0 EEEE TC    INTPRET
0669                     14,3253  66740 1      -XC,1 SLOAD*
0670  REF  20 LAST 401   14,3254  02537 1            NDXCTR
0671  REF  41 LAST 401   14,3255  02604 1            GENPI +11D,1
0672                     14,3256  00043 0      STORE 34D
0673                     14,3257  77745 1      DLOAD
0674                     14,3260  54206 1      PUSH  SL
0675                     14,3261  20211 1            8D
0676                     14,3262  43265 1      BDDV  DAD
0677                     14,3263  00043 0            34D
0678                     14,3264  00035 1            28D
0679                     14,3265  14035 1      STODL 28D
0680                     14,3266  55261 1      SL    BDDV
0681                     14,3267  20207 0            6
0682                     14,3270  00043 0            34D
0683                     14,3271  42523 0      PDDL* SL4
0684  REF  42 LAST 401   14,3272  02602 1            GENPI +9D,1
0685                     14,3273  77605 1      DMP
0686                     14,3274  77615 0      DAD
0687                     14,3275  00037 0            30D
0688                     14,3276  00037 0      STORE 30D
```

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```
0689                          14,3277   77776 1        EXIT
0690   REF  21 LAST 401       14,3300   4 1537 0       CS      NDXCTR
0691   REF   1               14,3301   6 3704 1       AD      60DEC
0692   REF   8 LAST 401       14,3302   6 1550 0       AD      RUN
0693   REF 211 LAST 401       14,3303   10 000 0       CCS     A
0694   REF  10 LAST 401       14,3304   3 6306 1       CAF     SIX
0695   REF  22 LAST 402       14,3305   27'537 0       ADS     NDXCTR
0696   REF   1               14,3306   1 3252 0       TCF     EEEE


0697   REF  29 LAST 401       14,3307   0 6112 0       TC      INTPRET
0698                          14,3310    41345 0       DLOAD   DMP
0699                          14,3311    00031 0               24D
0700                          14,3312    00037 0               30D
0701                          14,3313    41325 0       PDDL    DMP
0702                          14,3314    00033 1               26D
0703                          14,3315    00035 1               28D
0704                          14,3316    77625 0       DSU
0705                          14,3317    63525 0       PDDL    DSQ
0706                          14,3320    00031 0               24D
0707                          14,3321    65342 1       SR1     PDDL
0708                          14,3322    00041 1               32D
0709                          14,3323    41261 1       SL      DMP
0710                          14,3324    20212 1               11
0711                          14,3325    00033 1               26D
0712                          14,3326    55225 1       DSU     BDDV
0713                          14,3327    54205 1       DMP     SL
0714   REF   1               14,3330    31716 0               <<<<
0715                          14,3331    20204 0               3
0716   REF   9 LAST 300       14,3332    00343 0       STORE   DSPTEM2
0717                          14,3333    77776 1       EXIT

0718   REF   4 LAST 397       14,3334   3 1544 0       CA      POSITON
0719   REF  10 LAST 402       14,3335   54 344 0       TS      DSPTEM2 +2

0720   REF   1               14,3336   3 3677 1       CAF     V06N66E
0721   REF  37 LAST 394       14,3337   0 4657 1       TC      NVSBWAIT
0722   REF   8 LAST 392       14,3340   0 4622 0       TC      FLASHON
0723   REF  27 LAST 394       14,3341   0 4475 0       TC      ENDIDLE
0724   REF  17 LAST 397       14,3342   1 2770 1       TCF     ENDTEST
0725   REF  22 LAST 400       14,3343   3 6311 1       CAF     THREE
0726   REF   9 LAST 402       14,3344   55'550 1       TS      RUN
0727   REF 113 LAST 400       14,3345   3 7767 0       CAF     ZERO
0728   REF   1               14,3346   1 3204 0       TCF     DDDD -1
```

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```
R0729   THIS REVISION REFLECTS CHANGES AS OF
R0730    1/31/66
R0731   ENGINE ON/OFF NOW IN CHANNEL ELEVEN.  THE BITS FOR EACH CHANNEL GET TURNED ON ALL AT ONCE.  THEY STAY ON UNTIL
R0733    ;ENTER;IS PUSHED.  THEN THEY ALL GO OUT AND THE NEXT CHANNEL;S BITS ARE TURNED ON.
R0735   CHANNEL 5  BITS 1-8
R0736   CHANNEL 6  BITS 1-8
R0737   CHANNEL 11 BITS  13,14
R0738   CHANNEL 12 BITS 9-14
R0739   FOLLOWING THE CHANNEL 12 TESTS ENTER IS PRESSED.  CHANNEL 12 IS SET TO ZERO AND THE NEXT TEST BEGUN. LOW9
R0741   GOES IN LOCATION (COUNTER) 55.
R0742   INCREASE THROTTLE RATE DESCENT ENGINE
R0743   ;ENTER; NOW CAUSES THE CONTENTS OF 55 TO BE MADE NEGATIVE
R0744   DECREASE THROTTLE RATE DESCENT ENGINE
R0745   THE NEXT ;ENTER; ZEROS THE REGISTER AND SENDS A PULSE TRAIN (HERE ALTERN
R0746   ZEROS FOR CLARITY) TO THE ALTITUDE METER.
R0747   THE NEXT ;ENTER; WILL ADVANCE THE TEST TO THE ALTITUDE RATE METER TEST.
R0748   THE NEXT ;ENTER ; WILL TERMINATE THE TEST.

0749   REF  15 LAST 315     14,3347  3 7743 0  SAUTOIFS CA     POSMAX
0750   REF   1              14,3350  55,576 0           TS     NOBITS
0751   REF 114 LAST 402     14,3351  3 7767 0           CA     ZERO
0752   REF   1              14,3352  55,577 1           TS     CHAN
0753   REF   1              14,3353  55,575 0           TS     TEMP
0754   REF   1              14,3354  0 3356 1           TC     DINO
0755   REF   2 LAST 403     14,3355  25,577 0  BACK1     INCR   CHAN

0756   REF   3 LAST 403     14,3356  51,577 0  DINO      INDEX  CHAN
0757   REF   1              14,3357  3 3361 0           CA     SAUTLOCS
0758   REF   3 LAST 199     14,3360  1 5212 1           TCF    SWCALL
0759   REF   1              14,3361  31375 1  SAUTLOCS  CADR   CHAN5D
0760   REF   1              14,3362  31413 0           CADR   CHAN6D
0761   REF   1              14,3363  31421 1           CADR   CHAN11D
0762   REF   1              14,3364  31433 1           CADR   CHAN12D
0763   REF   1              14,3365  31445 0           CADR   PTITRDE
0764   REF   1              14,3366  31472 1           CADR   PTDTRDE
0765   REF   1              14,3367  31547 0           CADR   ALTMET
0766   REF   1              14,3370  31574 0           CADR   ALTRMET
0767   REF  18 LAST 402     14,3371  30770 1           CADR   ENDTEST
0768   REF   2 LAST 403     14,3372  31477 1  THROTADD  CADR   PTDTRDE +5
0769   REF   2 LAST 403     14,3373  31552 1  METERADD  CADR   ALTMET +3
0770   REF   2 LAST 403     14,3374  31577 0  RATEADD   CADR   ALTRMET +3
0771   REF   9 LAST 368     14,3375  3 7766 1  CHAN5D    CA     FIVE
0772   REF  36 LAST 392     14,3376  54 337 1           TS     DSPTEM1
0773   REF   7 LAST 332     14,3377  3 4564 1  2ENTRY    CA     LOW8          CHANNEL 6 RETURNS HERE
0774   REF  37 LAST 403     14,3400  54 340 1           TS     DSPTEM1 +1
0775                        14,3401  0 0006 1           EXTEND
0776   REF   2 LAST 403     14,3402  5 1575 1           INDEX  TEMP
0777                        14,3403  01 005 0           WRITE  5
```

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```
0778   REF   1                 14,3404   3 3666 1  3ENTRY   CA     V04N30D      CH11,12 RETURN HERE TO USE THE DISPLAY
0779   REF  38 LAST 402        14,3405   0 4657 1           TC     NVSBWAIT
0780   REF   1                 14,3406   3 3673 0  4ENTRY   CAF    WAITER       WAITER IS 03300
0781   REF  39 LAST 404        14,3407   0 4657 1           TC     NVSBWAIT
0782   REF  28 LAST 402        14,3410   0 4475 0           TC     ENDIDLE
0783   REF  19 LAST 403        14,3411   0 2770 0           TC     ENDTEST
0784   REF   1                 14,3412   0 3355 1           TC     BACK1

0785   REF   3 LAST 403        14,3413   25'575 1  CHAN6D   INCR   TEMP
0786   REF  38 LAST 403        14,3414   24 337 0           INCR   DSPTEM1
0787   REF 115 LAST 403        14,3415   3 7767 0           CAF    ZERO
0788                           14,3416   0 0006 1           EXTEND
0789                           14,3417   01 005 0           WRITE  5            GET RID OF CHANNEL 5 BITS
0790   REF   1                 14,3420   0 3377 1           TC     2ENTRY
0791   REF   1                 14,3421   3 4530 0  CHAN11D  CA     OCT11
0792   REF  39 LAST 404        14,3422   54 337 1           TS     DSPTEM1
0793   REF   1                 14,3423   3 5210 1           CA     BIT13-14
0794   REF  40 LAST 404        14,3424   54 340 1           TS     DSPTEM1 +1
0795                           14,3425   0 0006 1           EXTEND
0796                           14,3426   05 011 1           WOR    11           WOR IS NON EXCLUSIVE OR
0797   REF 116 LAST 404        14,3427   3 7767 0           CAF    ZERO
0798                           14,3430   0 0006 1           EXTEND
0799                           14,3431   01 006 0           WRITE  6
0800   REF   1                 14,3432   0 3404 1           TC     3ENTRY
0801   REF   1                 14,3433   3 4570 1  CHAN12D  CA     OCT12
0802   REF  41 LAST 404        14,3434   54 337 1           TS     DSPTEM1
0803   REF   2 LAST 404        14,3435   4 5210 0           CS     BIT13-14
0804                           14,3436   0 0006 1           EXTEND
0805                           14,3437   03 011 1           WAND   11
0806   REF   1                 14,3440   3 3671 1           CA     CH12BITS
0807   REF  42 LAST 404        14,3441   54 340 1           TS     DSPTEM1 +1
0808                           14,3442   0 0006 1           EXTEND
0809                           14,3443   05 012 1           WOR    12
0810   REF   2 LAST 404        14,3444   0 3404 1           TC     3ENTRY
0811   REF   2 LAST 404        14,3445   4 3671 0  PTITRDE  CS     CH12BITS
0812                           14,3446   0 0006 1           EXTEND
0813                           14,3447   03 012 1           WAND   12
0814   REF 117 LAST 404        14,3450   3 7767 0           CA     ZERO
0815   REF  43 LAST 404        14,3451   54 337 1           TS     DSPTEM1
0816   REF  44 LAST 404        14,3452   54 340 1           TS     DSPTEM1 +1
0817   REF   4 LAST 404        14,3453   55'575 0           TS     TEMP
0818   REF  30 LAST 390        14,3454   3 7763 1           CA     BIT1
0819   REF   2 LAST 403        14,3455   55'576 0           TS     NOBITS
0820                           14,3456   0 0004 0  PIT      INHINT
0821   REF  59 LAST 389        14,3457   0 5663 1           TC     WAITLIST
08215  REF  32 LAST 399                        E5           EBANK= XSM
0822                           14,3460    03503 1           2CADR  THROTASK
C0822  REF   1                 14,3461    30065 1
0823                           14,3462   0 0003 1           RELINT
0824   REF   2 LAST 404        14,3463   3 3673 0           CA     WAITER
```

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```
 0825   REF  40 LAST 404    14,3464   0 4657 1            TC     NVSBWAIT
 0826   REF  29 LAST 404    14,3465   0 4475 0            TC     ENDIDLE
 0827   REF  20 LAST 404    14,3466   0 2770 0            TC     ENDTEST
 0828   REF 118 LAST 404    14,3467   3 7767 0            CA     ZERO
 0829   REF   3 LAST 404    14,3470   55'576 0            TS     NOBITS
 0830   REF   2 LAST 404    14,3471   0 3355 1            TC     BACK1

 0831   REF 119 LAST 405    14,3472   3 7767 0  PIDTRDE   CA     ZERO
 0832   REF   3 LAST 378    14,3473   54 055 0            TS     THRJST
 0833   REF   1             14,3474   3 3372 1            CA     THROTADD
 0834   REF   1             14,3475   55'574 1            TS     TEMPADD
 0835   REF   8 LAST 382    14,3476   0 5545 0            TC     JOBSLEEP       THIS INHIBITS THE NEXT TASK UNTIL
R0836                                        CURRENT TASK HAS BEEN COMPLETED
 0837   REF  16 LAST 403    14,3477   3 7743 0            CA     POSMAX
 0838   REF   5 LAST 404    14,3500   55'575 0            TS     TEMP
 0839   REF  26 LAST 338    14,3501   3 7755 1            CA     BIT7
 0840   REF   1             14,3502   0 3456 0            TC     PIT
 0841   REF   4 LAST 405    14,3503   11'576 0  THROTASK  CCS    NOBITS         IS THIS TASK STILL REQ
 0842                       14,3504   0 3511 1            TC     +5             YES
 0843   REF   2 LAST 405    14,3505   3 1574 0            CA     TEMPADD        NO
 0844   REF   5 LAST 405    14,3506   55'576 0            TS     NOBITS
 0845   REF   7 LAST 381    14,3507   0 5551 0            TC     JOBWAKE
 0846   REF  47 LAST 381    14,3510   0 5727 0            TC     TASKOVER
 0847   REF   6 LAST 405    14,3511   11'575 0            CCS    TEMP
 0848   REF   1             14,3512   0 3525 0            TC     SOMETIME
 0849   REF   8 LAST 303    14,3513   3 4563 0            CA     LOW11
 0850   REF   4 LAST 405    14,3514   54 055 0  ALWAYS    TS     THRJST
 0851   REF  24 LAST 378    14,3515   3 7760 1            CA     BIT4
 0852                       14,3516   0 0006 1            EXTEND                A SMERZH FIX.
 0853                       14,3517   05 014 1            NOR    14
 0854   REF  24 LAST 396    14,3520   3 7756 1            CA     BIT6           320 MS.DELAY
 0855   REF  50 LAST 404    14,3521   0 5663 1            TC     WAITLIST
 08555  REF  33 LAST 404                 E5               EBANK= XSM
 0856                       14,3522    03503 1            2CADR  THROTASK
C0856   REF   2 LAST 404    14,3523    30065 1
 0857   REF  48 LAST 405    14,3524   0 5727 0            TC     TASKOVER
 0858   REF   9 LAST 405    14,3525   4 4563 1  SOMETIME  CS     LOW11
 0859   REF   1             14,3526   0 3514 1            TC     ALWAYS
 0860   REF   6 LAST 405    14,3527   11'576 0  ALTASK    CCS    NOBITS         IS TASK STILL REQ
 0861                       14,3530   0 3535 1            TC     +5
 0862   REF   3 LAST 405    14,3531   3 1574 0            CA     TEMPADD        NO
 0863   REF   7 LAST 405    14,3532   55'576 0            TS     NOBITS         ENABLES NEXT TASK
 0864   REF   8 LAST 405    14,3533   0 5551 0            TC     JOBWAKE
 0865   REF  49 LAST 405    14,3534   0 5727 0            TC     TASKOVER
 0866   REF   1             14,3535   3 3667 0            CA     ALBITS         ACTUAL TASK STARTS HERE
 0867   REF   2 LAST 109    14,3536   54 060 0            TS     ALTM
 0868   REF  16 LAST 284    14,3537   3 7761 0            CA     BIT3
 0869                       14,3540   0 0006 1            EXTEND
 0870                       14,3541   05 014 1            NOR    14
 0871   REF  25 LAST 405    14,3542   3 7756 1            CA     BIT6           320 MS. DELAY
```

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```
 0872   REF  61 LAST 405    14,3543   0 5663 1            TC      WAITLIST
 08725  REF  34 LAST 405                   E5              EBANK=  XSM
 0873                       14,3544    03527 1            2CADR   ALTASK
C0873   REF   1             14,3545    30065 1
 0874   REF  50 LAST 405    14,3546   0 5727 0            TC      TASKOVER
 0875   REF   1             14,3547   3 3373 0  ALTMET   CA      METERADD
 0876   REF   4 LAST 405    14,3550   55'574 1            TS      TEMPADD
 0877   REF   9 LAST 405    14,3551   0 5545 0            TC      JOBSLEEP
 0878   REF 120 LAST 405    14,3552   3 7767 0            CA      ZERO
 0879   REF   7 LAST 405    14,3553   55'575 0            TS      TEMP
 0880   REF  25 LAST 405    14,3554   4 7760 0            CS      BIT4
 0881                       14,3555   0 0006 1            EXTEND
 0882                       14,3556   03 014 1            WAND    14
 0883                       14,3557   0 0004 0            INHINT
 0884   REF 101 LAST 393    14,3560   3 7763 1            CA      ONE
 0885   REF  62 LAST 406    14,3561   0 5663 1            TC      WAITLIST
 08855  REF  35 LAST 406                   E5              EBANK=  XSM
 0886                       14,3562    03527 1            2CADR   ALTASK
C0886   REF   2 LAST 406    14,3563    30065 1
 0887                       14,3564   0 0003 1            RELINT
 0888   REF   3 LAST 404    14,3565   3 3673 0            CA      WAITFR
 0889   REF  41 LAST 405    14,3566   0 4657 1            TC      NVSBWAIT
 0890   REF  30 LAST 405    14,3567   0 4475 0            TC      ENDIDLE
 0891   REF  21 LAST 405    14,3570   0 2770 0            TC      ENDTEST
 0892   REF 121 LAST 406    14,3571   3 7767 0            CA      ZERO
 0893   REF   8 LAST 405    14,3572   55'576 0            TS      NOBITS
 0894   REF   3 LAST 405    14,3573   0 3355 1            TC      BACK1

 0895   REF   1             14,3574   3 3374 1  ALTRMET   CA      MRATEADD
 0896   REF   5 LAST 406    14,3575   55'574 1            TS      TEMPADD
 0897   REF  10 LAST 406    14,3576   0 5545 0            TC      JOBSLEEP
 0898   REF 102 LAST 406    14,3577   3 7763 1            CA      ONE
 0899   REF   8 LAST 406    14,3600   55'575 0            TS      TEMP            TEMP WILL BE INDEXED TO ACQUIRE BIT2 INS
C0900                                                                               TEAD OF BIT3
 0901   REF  19 LAST 376    14,3601   3 7762 0            CA      BIT2
 0902                       14,3602   0 0006 1            EXTEND
 0903                       14,3603   05 014 1            WOR     14
 0904   REF   3 LAST 403    14,3604   0 3557 0            TC      ALTMET +8D
```

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P0905       THE AOT ANGLE CHECKING PROGRAM PROVIDES A SIMPLE VERIFICATION OF THE ACCURACY OF THE AOT.  THE IDEA IS TO
R0907  COMPUTE THE ANGLE BETWEEN TWO LINES OF SIGHT AS INDICATED BY THE AOT, WHICH IS WHAT THIS PROGRAM DOES.
R0909  INDEPENDENT KNOWLEDGE OF THE INCLUDED ANGLE PROVIDES A COMPARISON AND THUS A MEASURE OF THE AOT ACCURACY.
R0911       THE ISS NEED NOT BE ON TO RUN THIS PROGRAM.


0912  REF  30 LAST 402   14,3605  0 6112 0  AOTANGCK  TC      INTPRET
0913                     14,3606   77414 0            SET     EXIT            IN CASE THE ISS IS OFF.
0914  REF   6 LAST 385   14,3607   00065 1            CDARFIN
0915  REF   3 LAST 381   14,3610  0 2135 1            TC      FINDNAVB        FOR LOS1 AND LOS2.
0916  REF  31 LAST 407   14,3611  0 6112 0            TC      INTPRET
0917                     14,3612   47375 0            VLOAD   VXV
0918  REF   2 LAST 383   14,3613   02601 1                    LOS1
0919  REF   2 LAST 384   14,3614   02607 1                    LOS2
0920                     14,3615   77646 0            ABVAL
0921  REF  12 LAST 357   14,3616   24023 0            STOVL   SINTH           SINTH = ABVAL (VXV ).
0922  REF   3 LAST 407   14,3617   02601 1                    LOS1
0923                     14,3620   77641 1            DOT
0924  REF   3 LAST 407   14,3621   02607 1                    LOS2
0925  REF  10 LAST 357   14,3622   34021 0            STCALL  COSTH           COSTH = V.V
0926  REF   8 LAST 357   14,3623   32476 0                    ARCTRIG
0927                     14,3624   77634 0            RTB
0928  REF   2 LAST 392   14,3625   33522 1                    1STO2S          DP 1S COMP TO SP 2S COMP.
0929  REF   6 LAST 342   14,3626   00025 0            STORE   THETA
0930                     14,3627   77776 1            EXIT
0931  REF   1            14,3630  3 3720 1            CAF     THETAADR
0932  REF  13 LAST 398   14,3631   6 0110 1            AD      FIXLOC
0933  REF 231 LAST 392   14,3632   54 146 0            TS      MPAC +2
0934  REF   1            14,3633  3 3676 0            CAF     V06N03E         XXX.XX DEGREES IN R1.
0935  REF  42 LAST 406   14,3634  0 4657 1            TC      NVSBWAIT
0936  REF  22 LAST 406   14,3635  1 2770 1            TCF     ENDTEST
```

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0937                                        E3          EBANK= 1400
0938                          14,3636  0 0004 0  ZEROERAS INHINT              PROGRAM BY MUNTZ TO ZERO ERASEABLE
09381  REF 122 LAST 406       14,3637  3 7767 0          CAF     ZERO
09382  REF   2 LAST  96       14,3640  54 026 1          TS      TIME3
0939   REF   1                14,3641  3 3665 1          CAF     OCT27
0940   REF  19 LAST 366       14,3642  54 003 0          TS      EBANK
0941                          14,3643  22 007 0  ZEROLP  ZL
0942   REF 212 LAST 402       14,3644  50 000 1          INDEX   A
0943                          14,3645  23'401 0          LXCH    1401
0944   REF  48 LAST 398       14,3646  6 7762 0          AD      TWO
0945   REF  20 LAST 408       14,3647  26 003 0          ADS     EBANK
0946   REF   8 LAST 403       14,3650  7 4564 0          MASK    LOW8
0947   REF 213 LAST 408       14,3651  10 000 0          CCS     A
0948   REF   1                14,3652  1 3643 1          TCF     ZEROLP
0949   REF  21 LAST 408       14,3653  10 003 0          CCS     EBANK
0950   REF   1                14,3654  1 3657 1          TCF     ZEROLP1
0951   REF  32 LAST 325       14,3655  0 5225 1          TC      POSTJUMP
0952   REF   2 LAST 253       14,3656    02000 0         CADR    SLAP1
0953                          14,3657  0 0003 1  ZEROLP1  RELINT
09531  REF 123 LAST 408       14,3660  3 7767 0          CAF     ZERO           KEEP T4RUPT GOING, BUT NOT CYCLING.
09532  REF   5 LAST 108       14,3661  54 347 0          TS      DSRUPTSW
0954                          14,3662  0 0004 0          INHINT
0955   REF 103 LAST 406       14,3663  4 7763 0          CS      ONE
0956   REF   2 LAST 408       14,3664  1 3643 1          TCF     ZEROLP
09565                         14,3665   00027 1  OCT27    OCT     27
```

L IMU PERFORMANCE TESTS 1 USER'S OWN PAGE NO. 30 S3 E3

```
 0958   REF   8 LAST 386                    E5          EBANK=  DGC
 0960                        14,3666  00430 0  VD4N30D  DCT     00430
 0961                        14,3667  52525 1  ALBITS   DCT     52525
 0962                        14,3670  70707 0  THRSBITS DCT     70707
 0963   REF   5 LAST 379                4570  DCT12    =       TEN
 0964   REF   1                         4530  DCT11    =       NINE
 0965                        14,3671  37400 1  CH12BITS DCT     37400
 0966                        14,3672  00130 0  VD1N30D  DCT     00130
 0967                        14,3673  03300 1  WAITER   DCT     03300


 0968                        14,3674  00130 0  VD1N30E  DCT     00130     FOR FINDNAVB
 0969                        14,3675  00530 1  VD5N30E  DCT     00530     FOR OPTDATA
 0970                        14,3676  00603 1  VD6N03E  DCT     00603
 0971                        14,3677  00666 1  VD6N66E  DCT     00666
 0972                        14,3700  02430 1  V24N30E  DCT     02430     FOR POSITION LOAD
 0973                        14,3701  02522 0  V25N22E  DCT     02522     FOR POS4

 0974                        14,3702  00013 0  11DEC    DEC     11
 0975                        14,3703  00021 1  17DEC    DEC     17
 0976                        14,3704  00074 1  60DEC    DEC     60
 0977                        14,3705  00077 1  63DEC    DEC     63
 0978                        14,3706  00105 0  69DEC    DEC     69        FOR MISALIGN
 0979                        14,3707  00110 1  72DEC    DEC     72        FOR STORRSLT

 0980                        14,3710  05670 0  300SEC   DEC     3000      3000 X 10 MSEC
 0981                        14,3711  13560 0  600SEC   DEC     6000      6000 X 10 MSEC

 0982   REF   9 LAST 409     14,3712  01500 0  DGCADR   ADRES   DGC       FOR ZEROING
 0983   REF  43 LAST 401     14,3713  01570 1  GENPLAD1 ADRES   GENPL
 0984   REF  44 LAST 409     14,3714  02570 1  GENPLADR ECADR   GENPL     FOR POS4
 0985                        14,3715  00322 1  <<KK     2DEC    210.39 B-14  1230 B-14 FOR CSM
C0985                        14,3716  14366 1
 0986   REF   1               14,3717  03114 0  RDRRETN  ADRES   RDR1 +1   FOR RDR37511
 0987   REF   7 LAST 407     14,3720  00024 1  THETAADR ECADR   THETA
 0988   REF  36 LAST 406     14,3721  01400 1  XSMADRX  ADRES   XSM       FOR MAKEXSMD

 0989                        14,3722  24365 1  SCALFTR  2DEC    .64       FOR STORRSLT
C0989                        14,3723  30244 0
 0990                        14,3724  07623 1  OMEG/MS  2DEC    .24339048 GYRO PULSES / 10 MSEC
C0990                        14,3725  26552 1
```

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P0991 THE FOLLOWING ROUTINE READS THE CLOCK AND SCALAR (CHANNELS 3 AND 4) INTO A AND L, INSURING THAT THE
R0993 DATA WAS NOT IN TRANSITION WHEN IT WAS READ.

```
0994                                        5026          BLOCK   02
0995                                5026    0 0004 0 FINETIME INHINT                  RETURNS WITH INTERRUPT INHIBITED.
0996                                5027    0 0006 1          EXTEND
0997  REF   1                      5030    00 004 0          READ    LOSCALAR
0998  REF  78 LAST 391             5031    54 001 1          TS      L

0999                                5032    0 0006 1          EXTEND                  SEE IF 2 READINGS AGREE. IF NOT, READ
1000  REF   2 LAST 410              5033    06 004 0          RXOR    LOSCALAR        LOSCALAR AGAIN.
1001                                5034    0 0006 1          EXTEND
1002                                5035    1 5041 0          BZF     +4

1003                                5036    0 0006 1          EXTEND                  IF CLOCK RIPPLED BEFORE, IT WONT NOW.
1004  REF   3 LAST 410              5037    00 004 0          READ    LOSCALAR
1005  REF  79 LAST 410              5040    54 001 1          TS      L

1006  REF  17 LAST 405              5041    4 7743 1  +4      CS      POSMAX          IF LOW PART CONTAINS SOMETHING LESS THAN
1007  REF  80 LAST 410              5042    6 0001 0          AD      L               POSMAX, THE HIGH PART CAN BE READ SAFELY
1008                                5043    0 0006 1          EXTEND
1009  REF   4 LAST 381              5044    1 5027 0          BZF     FINETIME +1     TRY AGAIN - CONDITION WILL DISAPPEAR.

1010                                5045    0 0006 1          EXTEND
1011  REF   1                      5046    00 003 1          READ    HISCALAR
1012  REF 155 LAST 396             5047    0 0002 0          TC      Q

1014  REF   2 LAST 389                      14,3726           SETLOC  OMEGXMS +2
1015  REF  55 LAST 399      14,3726 0 5206 0 REDYTORK         TC      BANKCALL
1016  REF  12 LAST 397      14,3727   26751 0                 CADR    IMUSTALL
1017  REF  23 LAST 407      14,3730 1 2770 1                 TCF     ENDTEST

1018  REF   2 LAST 380      14,3731 0 2752 0                 TC      OGCZERO

1019  REF  32 LAST 407      14,3732 0 6112 0                 TC      INTPRET
1020                        14,3733   77624 1                CALL
1021  REF   2 LAST 380      14,3734   30407 1                        ERTHRVSE        SETS UP EARTHRATE ANGLES AND TIME
1022                        14,3735   77776 1                EXIT
1023  REF   1               14,3736 3 1617 0                 CA      OPTNREG         INITIALIZE CDUNDX FOR PULSE CATCHING
1024  REF   3 LAST 247      14,3737 6 5336 1                 AD      NEG2            C(K) WAS 4 2 1 NOW C(A) IS 2 0 -1
1025  REF   1               14,3740   55,616 0               TS      GYTORETQ        C(K) = 2,0,-1 FOR  X,Y,Z.
1026                        14,3741 0 0006 1                 EXTEND
1027                        14,3742 1 3745 0                 BZF     +3
1028  REF  49 LAST 408      14,3743 3 7762 0                 CAF     TWO
1029                        14,3744 0 3746 1                 TC      +2
1030  REF 104 LAST 408      14,3745 3 7763 1                 CAF     ONE
1031  REF   1               14,3746   55,672 1               TS      CDUNDX          C(K) = 1 FOR Y, 2 FOR Z CDU SELECT
1032  REF  56 LAST 410      14,3747 0 5206 0                 TC      BANKCALL
1033  REF   1               14,3750   50551 0                CADR    ENABLE
1034                        14,3751   37777 1  CHKSUM14      OCT     37777
```

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```
0001                                  24,2000          BANK   24
0002   REF  37 LAST 409                  E5           EBANK= XSM


00021  REF 124 LAST 408   24,2000  3 7767 0  IMUTEST  CA     ZERO        DRIFT AND SCALE FACTOR TEST
00022  REF   1            24,2001  55'576 0           TS     DRIFTT
00023  REF   1            24,2002  55'742 0           TS     GEOCOMPS
00024  REF   1            24,2003  3 3714 0           CAF    1SECX
00025  REF   1            24,2004  55'744 0           TS     1SECXT

0003   REF  33 LAST 410   24,2005  0 6112 0           TC     INTPRET
0004                      24,2006   77624 1           CALL
0005   REF   2 LAST 380   24,2007   30553 1                  LATA7CHK
0006                      24,2010   77776 1           EXIT
0009   REF 105 LAST 410   24,2011  3 7763 1           CA     ONE
0010   REF   5 LAST 402   24,2012  55'544 1           TS     POSITON

0011   REF  11 LAST 402   24,2013  54 344 0           TS     DSPTEM2 +2
00111  REF 106 LAST 411   24,2014  3 7763 1  GEOIMUTT CA     ONE         COMPASS COMES IN HERE
0012   REF  11 LAST 394   24,2015  54 400 1           TS     THETAD
0013   REF  12 LAST 411   24,2016  54 401 0           TS     THETAD +1
0014   REF  13 LAST 411   24,2017  54 402 0           TS     THETAD +2
0015   REF  57 LAST 410   24,2020  0 5206 0           TC     BANKCALL
0016   REF   3 LAST 380   24,2021   26000 0           CADR   IMUZERO
0017   REF  58 LAST 411   24,2022  0 5206 0           TC     BANKCALL
0018   REF  13 LAST 410   24,2023   26751 0           CADR   IMUSTALL
0019   REF   1            24,2024  1 2250 0           TCF    ENDTEST1
0020   REF 125 LAST 411   24,2025  3 7767 0  IMUBACK  CA     ZERO
0021   REF  12 LAST 411   24,2026  54 343 1           TS     DSPTEM2 +1
0022   REF  23 LAST 402   24,2027  55'537 0           TS     NDXCTR
0023   REF   1            24,2030  55'574 1           TS     TORQNDX
0024   REF   2 LAST 411   24,2031  55'575 0           TS     TORQNDX +1
0026   REF   1            24,2032  3 3644 1           CAF    TESTTIME
0028   REF  13 LAST 411   24,2033  54 342 0           TS     DSPTEM2
0029   REF  59 LAST 411   24,2034  0 5206 0           TC     BANKCALL    ISS RETURNS IN COARSE ALIGN MODE TO
0030   REF   3 LAST 385   24,2035   26065 0           CADR   IMUCOARS    ENABLE OPERATOR TO DECIDE WHAT TO DO
R0031  ABOUT GIMBAL LOCK
00311  REF   2 LAST 411   24,2036  11'742 0           CCS    GEOCOMPS
00312                     24,2037  0 2042 0           TC     +3
0032   REF   1            24,2040  0 3576 0           TC     SHOWID
0033   REF   1            24,2041  0 3605 1           TC     SHOW


0034   REF  60 LAST 411   24,2042  0 5206 0           TC     BANKCALL
0035   REF  14 LAST 411   24,2043   26751 0           CADR   IMUSTALL
0036   REF   2 LAST 411   24,2044  0 2250 1           TC     ENDTEST1
0037   REF   1            24,2045  0 3353 1           TC     NBPOSPL
0038   REF   1            24,2046  0 3104 1           TC     POSGMBL
```

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```
0039  REF   1              24,2047  0 2113 0            TC      PIPACHK        IF MGA IS 60DEG+ PROG WILL STAY IN COARS
C0040                                                                         ALIGN AND MEASURE VERTICAL PIPA RATE
0041  REF   1              24,2050  0 3133 0            TC      FALNF
0042  REF  51 LAST 411     24,2051  0 5206 0            TC      BANKCALL
0043  REF  15 LAST 411     24,2052    26751 0           CADR    IMJSTALL
0044  REF   3 LAST 411     24,2053  1 2250 0            TCF     ENDTEST1
00442 REF   3 LAST 411     24,2054  11,742 0            CCS     GEOCOMPS
00443 REF   1              24,2055  0 2076 1            TC      JUMPLOAD
0045  REF  34 LAST 411     24,2056  0 6112 0  GUESS     TC      INTPRET        CALCULATE -COS LATITUDE AND SIN LATITUDE
0046                       24,2057    71545 0           DLOAD   COS            FOR ESTIMATE
0047  REF   5 LAST 392     24,2060    02511 0                   LATITUDE
0048                       24,2061    72476 1           DCOMP   SL1
0049  REF   1              24,2062    16573 1           STODL   WANGT
0050  REF   6 LAST 412     24,2063    02511 0                   LATITUDE
0051                       24,2064    72556 1           SIN     SL1
0052  REF   1              24,2065    26571 0           STOVL   WANGD          LOAD TRANSITION MATRIX INTO ERASABLE
00521 REF   1              24,2066    11716 1                   GEORGED
00522 REF   1              24,2067    26721 1           STOVL   TRANSM1
00523 REF   1              24,2070    11724 0                   GEORGEC
00524 REF   2 LAST 412     24,2071    26727 1           STOVL   TRANSM1 +6
00525 REF   1              24,2072    11732 1                   GEORGEB
00526 REF   3 LAST 412     24,2073    02735 1           STORE   TRANSM1 +12D
0053                       24,2074    77776 1           EXIT
005301                     24,2075  0 2077 0            TC      +2
00531 REF  11 LAST 397     24,2076  0 4724 1  JUMPLOAD  TC      FREEDSP        FREE DISPLAY IF IN GYROCOMPASS
00532 REF   1              24,2077  0 3621 1            TC      LOADGTSM
0054  REF  52 LAST 412     24,2100  0 5206 0            TC      BANKCALL
0055  REF   1              24,2101    72014 1           CADR    ESTIMS
0075  REF  10 LAST 327     24,2102  0 4161 0  TORQUE    TC      PHASCHNG       FILTER RETURNS AFTER TORQUE AND ER SET
0076                       24,2103    00005 1           OCT     00005
0081  REF 126 LAST 411     24,2104  3 7767 0            CA      ZERO
0082  REF  14 LAST 411     24,2105    54 342 0          TS      DSPTEM2
0083  REF   1              24,2106  3 1640 1            CA      DRIFT1
0084  REF  15 LAST 412     24,2107    54 343 1          TS      DSPTEM2 +1
0085  REF   6 LAST 411     24,2110    51,544 0          INDEX   POSITON
0086  REF   1              24,2111    55,551 0          TS      SOUTHDR -1
0087  REF   2 LAST 411     24,2112  0 3605 1            TC      SHOW

0088  REF  24 LAST 411     24,2113    51,537 1  PIPACHK   INDEX   NDXCTR         TORQUE PLATFORM TO CORRECT  LEVELING ERR
0089                       24,2114  0 2115 0            TC      +1             IN PREPARATION TO MEASURING VERTICAL
0090  REF  53 LAST 412     24,2115  0 5206 0            TC      BANKCALL       PIPA OUTPUT PULSE RATE
0091  REF   3 LAST 384     24,2116    30424 0           CADR    EARTHR

0092  REF   1              24,2117  3 3647 1            CA      DEC17          ALLOW PIP COUNTER TO OVERFLOW 17 TIMES
0093  REF   1              24,2120    55,632 0          TS      DATADL +4
0094  REF  32 LAST 383     24,2121  3 7752 0            CA      BIT10          IN THE ALLOTED TIME INTERVAL
0095  REF   1              24,2122    55,527 1          TS      LENGTHOT
0096  REF 107 LAST 411     24,2123  3 7763 1            CA      ONE
0097  REF   1              24,2124    55,673 0          TS      RESULTCT
0098  REF 127 LAST 412     24,2125  3 7767 0            CA      ZERO           ZERO PIPA COUNTER INITIALLY
```

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```
0099   REF   3 LAST 382   24,2126   51'541 0          INDEX   PIPINDEX
0100   REF   6 LAST 381   24,2127   54 037 1          TS      PIPAV
0101   REF   2 LAST 412   24,2130   55'626 0          TS      DATAPL
0102   REF   1            24,2131   3 3661 0          CA      DEC56          LOOP 56 TIMES 5.12 SEC EACH. EACH INCR.
0103   REF   1            24,2132   0 3214 0          TC      WAITLOOP       WILL ALSO CORRECT EARTH RATE
0104                      24,2133   0 0004 0          INHINT
0105   REF   1            24,2134   0 2776 0          TC      CHECKG
0106                      24,2135   0 0003 1          RELINT
0107   REF   1            24,2136   0 3072 1          TC      DATALD
0108   REF  10 LAST 403   24,2137   3 7766 1          CA      FIVE
0109   REF   2 LAST 412   24,2140   55'673 0          TS      RESJITCT
0110   REF  25 LAST 412   24,2141   51'537 1          INDEX   NDXCTR
0111                      24,2142   0 2143 0          TC      +1
0112   REF  54 LAST 412   24,2143   0 5206 0          TC      BANKCALL
0113   REF   4 LAST 412   24,2144    30424 0          CADR    EARTHR
0114   REF   1            24,2145   11'676 0          CCS     COUNTPL
0115   REF   1            24,2146   0 3236 0          TC      WAITLP2
0116   REF   3 LAST 413   24,2147   11'627 1          CCS     DATAPL +1
0117                      24,2150   0 2154 0          TC      +4
0118   REF  11 LAST 285   24,2151   0 4736 1          TC      CCSHOLE
0119   REF   4 LAST 413   24,2152   4 1632 0          CS      DATAPL +4
0120   REF   5 LAST 413   24,2153   55'632 0          TS      DATAPL +4
0121                      24,2154   0 0006 1          EXTEND
0122   REF   6 LAST 413   24,2155   4 1627 1          DCS     DATAPL
0123   REF   7 LAST 413   24,2156   21'633 1          DAS     DATAPL +4

0124   REF  35 LAST 412   24,2157   0 6112 0          TC      INTPRET
0125                      24,2160    45345 1          DLOAD   DSU
0126   REF   8 LAST 413   24,2161    02635 0                  DATAPL +6
0127   REF   9 LAST 413   24,2162    02631 1                  DATAPL +2
0128                      24,2163    56325 0          PDDL    DDV
0129   REF  10 LAST 413   24,2164    02633 0                  DATAPL +4
0130                      24,2165    41325 0          PDDL    DMP
0131   REF   1            24,2166    11651 0                  DEC585         DEC585 HAS BEEN REDEFINED FOR LEM
0132                      24,2167    77634 0          RTB
0133   REF   3 LAST 390   24,2170    33520 0                  SGNAGREE
0134   REF  16 LAST 412   24,2171    00343 0          STORE   DSPTEM2
0135                      24,2172    77776 1          EXIT
0136   REF   3 LAST 412   24,2173   0 3605 1          TC      SHOW
0137   REF   1            24,2174   3 3642 1  VERTDRFT CA      3900DEC        3900 SECONDS FOR VERTICAL DRIFT
0138   REF   2 LAST 412   24,2175   55'527 1          TS      LENGTHOT
01381  REF  55 LAST 413   24,2176   0 5206 0          TC      BANKCALL       THIS WILL CORRECT FOR EARTH RATE DURING
01382  REF   5 LAST 413   24,2177    30424 0          CADR    EARTHR         TIME SPENT IN SHOW ABOVE*
01383  REF  13 LAST 398   24,2200   3 0032 0          CA      CDUX           STOORE AXIS  FOR LAB CALC OF DRIFT
01384  REF   1            24,2201   55'530 1          TS      LOSVEC
0139   REF   7 LAST 412   24,2202   51'544 0          INDEX   POSITON
0140   REF   2 LAST 412   24,2203   4 1550 1          CS      SOUTHDR -2
0141   REF   2 LAST 411   24,2204   55'576 0          TS      DRIFTT
014101 REF   2 LAST 412   24,2205   0 3621 1          TC      LOADGTSM
0142   REF 128 LAST 412   24,2206   3 7767 0          CA      ZERO           ALLOW ONLY SOUTH GYRO EARTH RATE COMPENS
```

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```
0143  REF  38 LAST 411   24,2207  55'400 0          TS    XSM
0144  REF  39 LAST 414   24,2210  55'401 1          TS    XSM +1
0145  REF  40 LAST 414   24,2211  55'404 1          TS    XSM +4
0146  REF  41 LAST 414   24,2212  55'405 0          TS    XSM +5
0147  REF   9 LAST 395   24,2213  55'406 0          TS    YSM
0148  REF  10 LAST 414   24,2214  55'407 1          TS    YSM +1
0149  REF  11 LAST 414   24,2215  55'412 0          TS    YSM +4
0150  REF  12 LAST 414   24,2216  55'413 1          TS    YSM +5
0151  REF   8 LAST 395   24,2217  55'414 0          TS    ZSM
0152  REF   9 LAST 414   24,2220  55'415 1          TS    ZSM +1
0153  REF  10 LAST 414   24,2221  55'420 1          TS    ZSM +4
0154  REF  11 LAST 414   24,2222  55'421 0          TS    ZSM +5
0155  REF  18 LAST 410   24,2223  3 7743 0  GUESS1  CAF   POSMAX
0156  REF   3 LAST 411   24,2224  55'574 1          TS    TORQNDX
0157  REF   4 LAST 414   24,2225  55'575 0          TS    TORQNDX +1
0158  REF  56 LAST 413   24,2226  0 5206 0          TC    BANKCALL
0159  REF   2 LAST 412   24,2227   72014 1          CADR  ESTIMS
0160  REF  11 LAST 412   24,2230  0 4161 0  VALMIS  TC    PHASCHNG
0161                     24,2231   00005 1          OCT   00005
0170  REF   1            24,2232  3 1636 0          CA    DRIFTO
0171  REF  17 LAST 413   24,2233  54 343 1          TS    DSPTEM2 +1
01711 REF  14 LAST 413   24,2234  3 0032 0          CA    CDUX        STORE OG ANGLE FOR LAB CALC OF DRIFT**
01715 REF   2 LAST 413   24,2235  55'531 0          TS    LOSVFC +1
0172  REF 129 LAST 413   24,2236  3 7767 0          CA    ZERO
0173  REF  18 LAST 414   24,2237  54 342 0          TS    DSPTEM2
0174  REF   4 LAST 413   24,2240  0 3605 1          TC    SHOW


0175  REF 108 LAST 412   24,2241  3 7763 1  FINISH  CA    ONE
0176  REF   8 LAST 413   24,2242  6 1544 0          AD    POSITON
0177  REF  19 LAST 414   24,2243  54 344 0          TS    DSPTEM2 +2
0178  REF  50 LAST 410   24,2244  3 7762 0          CA    TWO
0179  REF  24 LAST 399   24,2245  55'546 0          TS    DPLACE
0180  REF  57 LAST 414   24,2246  0 5206 0          TC    BANKCALL
0181  REF   2 LAST 210   24,2247   22342 1          CADR  TSELECT -6
0182  REF  58 LAST 414   24,2250  0 5206 0  ENDTEST1 TC    BANKCALL
0183  REF  24 LAST 410   24,2251   30770 1          CADR  ENDTEST
```

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```
0184  REF   1              24,2252  3 3652 0  OPCHK     CAF     DELYOFF      AUTOMATIC TEST FOR SYSTEM OPERATION
0185                       24,2253  0 0006 1            EXTEND
0186                       24,2254  02 030 0            RAND    30           CHECK TO SEE IF IMU IS ON
0187  REF 214 LAST 408     24,2255  10 000 0            CCS     A
0188  REF   1              24,2256  0 2444 1            TC      ALARMS
0189  REF   1              24,2257  3 3645 0            CAF     V16N20S
0190  REF  43 LAST 407     24,2260  0 4657 1            TC      NVSBWAIT

0191  REF  12 LAST 412     24,2261  0 4724 1            TC      FREENSP
0192  REF  59 LAST 414     24,2262  0 5206 0            TC      BANKCALL
0193  REF   4 LAST 411     24,2263   26000 0            CADR    IMUZERO
0194  REF  70 LAST 415     24,2264  0 5206 0            TC      BANKCALL
0195  REF  16 LAST 412     24,2265   26751 0            CADR    IMUSTALL

0196  REF   4 LAST 412     24,2266  1 2250 0            TCF     ENDTEST1
0197  REF  12 LAST 370     24,2267  3 7754 0            CA      BIT8         ZERO ALL ERASEABLE USED IN TEST
0198  REF   2 LAST 387     24,2270  55'777 0            TS      ZERONDX
0199  REF   1              24,2271  3 3655 1            CA      GENPLAD
0200  REF   2 LAST 387     24,2272  0 3245 1            TC      ZEROING
0201  REF   2 LAST 411     24,2273  0 3353 1            TC      NBPOSPL      ALIGN ANGLE COMPUTATION

0202  REF   2 LAST 411     24,2274  0 3104 1            TC      POSGMBL      COARSE ALIGN THOSE GIMBALS NOW

0203  REF   2 LAST 210     24,2275  1 2252 1            TCF     OPCHK
0204  REF   2 LAST 412     24,2276  0 3133 0            TC      FALNF        FINE ALIGN PLATFORM BY TORQUING GYROS

0205  REF  71 LAST 415     24,2277  0 5206 0            TC      BANKCALL
0206  REF  17 LAST 415     24,2300   26751 0            CADR    IMUSTALL
0207  REF   5 LAST 415     24,2301  1 2250 0            TCF     ENDTEST1
0208  REF  51 LAST 414     24,2302  3 7762 0            CA      TWO
0209  REF   2 LAST 410     24,2303  55'672 1  CDUCHECK  TS      CDUNDX       THIS LOOP CHECKS FOR NO ERROR BETWEEN
0210  REF   3 LAST 415     24,2304  51'672 0            INDEX   CDUNDX       DESIRED CDU ANGLES AND THE ACTUAL ANGLES
0211  REF  14 LAST 411     24,2305  4 0400 1            CS      THETAD
0212  REF   4 LAST 415     24,2306  51'672 0            INDEX   CDUNDX
0213  REF  15 LAST 414     24,2307  6 0032 0            AD      CDUX
0214  REF   5 LAST 395     24,2310  55'551 0            TS      STORFPL
0215  REF   6 LAST 415     24,2311  11'551 0            CCS     STORFPL
0216  REF   1              24,2312  0 2320 1            TC      ERRMASK
0217  REF   1              24,2313  0 2315 1            TC      NOERR
0218  REF   2 LAST 415     24,2314  0 2320 1            TC      ERRMASK
0219  REF   5 LAST 415     24,2315  11'672 1  NOERR     CCS     CDUNDX
0220  REF   1              24,2316  0 2303 0            TC      CDUCHECK
0221  REF   1              24,2317  0 2324 0            TC      LOADIC
0222  REF   1              24,2320  7 3660 0  ERRMASK  MASK    LOWFOUR      ALLOW FIVE BIT ERRORS
0223  REF 215 LAST 415     24,2321  10 000 0            CCS     A
0224  REF   2 LAST 415     24,2322  0 2444 1            TC      ALARMS
0225  REF   2 LAST 415     24,2323  0 2315 1            TC      NOERR
0226  REF 109 LAST 414     24,2324  3 7763 1  LOADIC    CA      ONE
0227  REF   3 LAST 413     24,2325  55'673 0            TS      RESJETET
0228  REF 110 LAST 415     24,2326  4 7763 0            CS      ONE
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0229  REF   1              24,2327  55,670 0          TS    MASKREG     SETS UP AZIMUTH AND VERTICAL VECTORS FOR

0230  REF 130 LAST 414     24,2330  3 7767 0          CA    ZERO
0231  REF   7 LAST 413     24,2331  54 037 1          TS    PIPAX
0232  REF   4 LAST 381     24,2332  54 040 1          TS    PIPAY
0233  REF   5 LAST 381     24,2333  54 041 0          TS    PIPAZ

0234  REF  21 LAST 285     24,2334  3 7751 0          CA    BIT11
0235  REF   3 LAST 413     24,2335  55,527 1          TS    LENGTHOT    VECTOR IN PIPA COUNTERS
0236  REF 111 LAST 415     24,2336  3 7763 1          CA    ONE
0237  REF   2 LAST 413     24,2337  0 3214 0          TC    WAITLOOP
0238  REF   2 LAST 413     24,2340  11,676 0          CCS   COUNTPL
0239  REF   2 LAST 413     24,2341  0 3236 0          TC    WAITLP2
0240  REF   2 LAST 413     24,2342  3 3661 0          CA    DEC56
0241  REF   3 LAST 416     24,2343  0 3214 0          TC    WAITLOOP
0242  REF  52 LAST 415     24,2344  3 7762 0  OPCHK1  CA    TWO
0243  REF   4 LAST 413     24,2345  55,541 1  OPCHK2  TS    PIPINDEX
0244                       24,2346  0 0004 0          INHINT
0245  REF   2 LAST 413     24,2347  0 2776 0          TC    CHECKG
0246                       24,2350  0 0003 1          RELINT
0247  REF 131 LAST 416     24,2351  3 7767 0          CA    ZERO
0248  REF   5 LAST 416     24,2352  51,541 0          INDEX PIPINDEX
0249  REF   8 LAST 416     24,2353  54 037 1          TS    PIPAX
0250  REF   2 LAST 413     24,2354  0 3072 1          TC    DATALD      LOAD PIPA DATA AND TIME IN DATAPL
0251  REF   4 LAST 415     24,2355  57,673 1          XCH   RESJLTCT
0252  REF   9 LAST 368     24,2356  6 7761 0          AD    FOUR
0253  REF   5 LAST 416     24,2357  55,673 0          TS    RESJLTCT
0254  REF   6 LAST 416     24,2360  11,541 1          CCS   PIPINDEX
0255  REF   1              24,2361  0 2345 1          TC    OPCHK2
0256  REF  10 LAST 416     24,2362  4 7761 1  READOUT CS    FOUR
0257  REF   6 LAST 416     24,2363  6 1673 1          AD    RESJLTCT
0258  REF   7 LAST 416     24,2364  55,673 0          TS    RESJLTCT
0259                       24,2365  22 007 0          ZL
0260  REF   8 LAST 416     24,2366  51,673 1          INDEX RESJLTCT
0261  REF  11 LAST 413     24,2367  3 1626 1          CA    DATAPL
0262  REF 216 LAST 415     24,2370  22 000 1          LXCH  A
0263  REF   9 LAST 416     24,2371  51,673 1          INDEX RESJLTCT
0264  REF  45 LAST 409     24,2372  21,572 1          DAS   GENPL +1
0265  REF  10 LAST 416     24,2373  3 1673 1          CA    RESJLTCT
0266  REF   2 LAST 416     24,2374  7 1670 0          MASK  MASKREG
0267  REF 217 LAST 416     24,2375  10 000 0          CCS   A
0268  REF   1              24,2376  0 2362 1          TC    READOUT
0269  REF   6 LAST 409     24,2377  3 4570 1          CA    TEN
0270  REF  23 LAST 402     24,2400  6 6311 1          AD    THREE
0271  REF  11 LAST 416     24,2401  55,673 0          TS    RESJLTCT
0272  REF 218 LAST 416     24,2402  4 0000 0          CS    A
0273  REF   3 LAST 416     24,2403  55,670 0          TS    MASKREG
0274  REF   3 LAST 416     24,2404  11,676 0          CCS   COUNTPL
0275  REF   3 LAST 416     24,2405  0 3236 0          TC    WAITLP2
0276  REF   1              24,2406  0 3257 1          TC    COMPUT
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0277  REF   1              24,2407  3 3646 0  RADCK    CA     V16N40S
0278  REF  44 LAST 415     24,2410  0 4657 1           TC     NVSBWAIT    OPERATOR WILL CHECK RADAR STATUS.IN LAB.
0279  REF   9 LAST 402     24,2411  0 4622 0           TC     FLASHON     SET RADAR OFF THEN PUT RESOLVER STANDARD
0280  REF  31 LAST 406     24,2412  0 4475 0           TC     ENDIDLE     ON TRUNNION AND SET TO +45 DEG.SHAFT WIL
0281  REF   6 LAST 415     24,2413  0 2250 1           TC     ENDTEST1
0282                       24,2414  0 2415 0           TC     +1          AFTER SETTING RES STANDARD DO A V33
0283  REF 132 LAST 416     24,2415  3 7767 0           CA     ZERO
0284  REF  18 LAST 359     24,2416  54 423 0           TS     TANG +1
0285  REF   1              24,2417  3 3662 0           CA     45DEG
0286  REF  19 LAST 417     24,2420  54 422 1           TS     TANG
0287  REF  72 LAST 415     24,2421  0 5206 0  DRIVRAD  TC     BANKCALL    IN SC WHEN RAD PRESENT DO V33 RIGHT AWAY
0288  REF   3 LAST 399     24,2422   20250 1           CADR   RRZERO      LGC WILL ATTEMPT TO DRIVE 45 DEG TRUNN.
0289  REF  73 LAST 417     24,2423  0 5206 0           TC     BANKCALL    TO MATCH STANDARD, AFTER ZEROING CDUS
0290  REF   5 LAST 399     24,2424   26745 0           CADR   RADSTALL
0291  REF   7 LAST 417     24,2425  0 2250 1           TC     ENDTEST1
0292  REF  74 LAST 417     24,2426  0 5206 0           TC     BANKCALL
0293  REF   2 LAST 207     24,2427   20364 1           CADR   RRDESNB

0295  REF  75 LAST 417     24,2430  0 5206 0           TC     BANKCALL
0296  REF   6 LAST 417     24,2431   26745 0           CADR   RADSTALL    IF CDU FAILS TO AGREE WITH COMMAND TO
0297  REF   3 LAST 415     24,2432  0 2444 1           TC     ALARMS      1 DEG GET ALARM HERE

0298  REF  10 LAST 417     24,2433  0 4622 0           TC     FLASHON     OPERATOR WILL CHECK STATUS OF RADAR
0299  REF  32 LAST 417     24,2434  0 4475 0           TC     ENDIDLE     IN S/C DO V33 TO CONTINUE WITH SHAFT
0300  REF   8 LAST 417     24,2435  0 2250 1           TC     ENDTEST1    TEST
0301                       24,2436  0 2437 0           TC     +1          IN LAB TURN RADAR OFF CHANGE RES STANDAR
0302  REF 133 LAST 417     24,2437  3 7767 0           CA     ZERO        TO SHAFT AND SET FOR -45DEG.
0303  REF  20 LAST 417     24,2440  54 422 1           TS     TANG        THEN DO A V33 IF WANT TO REPEAT CHECK
0304  REF   2 LAST 417     24,2441  4 3662 1           CS     45DEG       DO A V34 TO TERMINATE
0305  REF  21 LAST 417     24,2442  54 423 0           TS     TANG +1
0306  REF   1              24,2443  0 2421 1           TC     DRIVRAD
0307  REF 156 LAST 410     24,2444  56 002 0  ALARMS   XCH    Q
0308  REF  25 LAST 414     24,2445  55'546 0           TS     QPLACE
0309  REF  34 LAST 399     24,2446  0 4755 1           TC     ALARM
0310                       24,2447   01411 1           OCT    1411
0311  REF  26 LAST 417     24,2450  0 1546 1           TC     QPLACE
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0312  REF  36 LAST 413   24,2451  0 6112 0  GYRSFTST  TC    INTPRET     START ADRESS FOR IRIG SF TEST
0313                     24,2452    77624 1           CALL
0314  REF   3 LAST 411   24,2453    30553 1           LATAZCHK    LOAD AZ AND LAT
0315                     24,2454    77776 1           EXIT
0316  REF   1            24,2455  3 3635 1  TESTCALL  CAF   V21N30E
0317  REF  45 LAST 417   24,2456  0 4657 1            TC    NVSBWAIT    LOAD + OR - 1 FOR + OR - X TEST (+00001)
0318  REF  33 LAST 417   24,2457  0 4475 0            TC    ENDIDLE     LOAD + OR - 2 FOR + OR - Y TEST
0319  REF   9 LAST 417   24,2460  1 2250 0            TCF   ENDTEST1    LOAD + OR - 3 FOR + OR - Z TEST
0320  REF   1            24,2461  0 2455 1            TC    TESTCALL
0321  REF  45 LAST 404   24,2462  56 337 0           XCH   DSPTEM1
0322  REF   1            24,2463  55'614 1           TS    CALCDIR
03221                    24,2464  0 0006 1           EXTEND              THIS ROUTINE LOOKS AT THE SIZE OF THE
03222  REF   1           24,2465  6 2472 1           BZMF  NEGSIZ        ENTRY MADE BY THE OPERATOR, IF HE DID NO
03223  REF   2 LAST 153  24,2466  7 5340 1  SIZLOOK  MASK  NEG3         T ENTER TEST NO THAT IS W/I PERMISSIBLE
03224                    24,2467  0 0006 1           EXTEND              RANGE- HE WILL BE ASKED TO LOAD AGAIN.
03225  REF   1           24,2470  1 2474 0           BZF   GJDENTRY        THIS IS CONSIDERED NECESSARY BECAUSE
03226  REF   2 LAST 418  24,2471  0 2455 1           TC    TESTCALL    OF FOLLOWING INDEXED TC WHICH COULD

03227                    24,2472  4 0000 0  NEGSIZ   COM                 SEND THE COMPUTER OFF INTO THE BOONDOCKS
03228  REF   1           24,2473  0 2466 1           TC    SIZLOOK     TO PLAY WITH ITSELF IF THE OPERATOR
03229  REF   2 LAST 418  24,2474  3 1614 0  GJDENTRY  CA    CALCDIR     MAKES ABAD ENTRY******
0323   REF  11 LAST 416  24,2475  6 7761 0           AD    FOUR
0324   REF 219 LAST 416  24,2476  50 000 1           INDEX A
0325                     24,2477  0 2500 0           TC    +1
0326   REF   3 LAST 418  24,2500  0 2455 1           TC    TESTCALL
0327                     24,2501  0 2507 1           TC    +6            C(A)=+00001 FOR -Z
0328                     24,2502  0 2506 0           TC    +4            C(A)=+00002 FOR -Y
0329                     24,2503  0 2505 0           TC    +2            C(A)=+00003 FOR -X
0330                     24,2504  0 2500 0           TC    -4            C(A)=+00004   ERROR
0331                     24,2505  0 2510 1           TC    +3            C(A)=+00005 FOR +X
0332                     24,2506  0 2514 0           TC    +6
0333                     24,2507  0 2517 0           TC    +10
0334  REF  12 LAST 418   24,2510  3 7761 0           CAF   FOUR
0335  REF   9 LAST 414   24,2511  55'544 1          TS    POSITON     4 IS FOR A.L. POSN 4 USED FOR X SF TEST
0336                     24,2512  0 2521 0           TC    +7
0337                     24,2513  0 2521 0           TC    +6
0338  REF  53 LAST 416   24,2514  3 7762 0           CAF   TWO
0339  REF  10 LAST 418   24,2515  55'544 1          TS    POSITON     +2 IS A.L. POS 2 USED FOR Y SF TEST
0340                     24,2516  0 2521 0           TC    +3
0341   REF 112 LAST 416  24,2517  3 7763 1           CAF   ONE
0342  REF  11 LAST 418   24,2520  55'544 1          TS    POSITON     +1 IS A.L. POS 1 USED FOR Z SF TEST
0343  REF   2 LAST 410   24,2521  55'617 1          TS    OPTNREG     C(K) = (4,2,1) FOR X,Y,Z
0344  REF   1            24,2522  55'621 1          TS    SAVE +1
0345  REF  13 LAST 415   24,2523  0 4724 1           TC    FREEDSP
0346  REF 134 LAST 417   24,2524  3 7767 0           CAF   ZERO
0347  REF   1            24,2525  55'536 1          TS    NBPOS       SET UP NB COORD TO Z NORTH, X UP
0348  REF   2 LAST 418   24,2526  55'622 1          TS    SAVE +2     INITIALIZE FOR EARTHR DESIGNATE USAGE
0349  REF   1            24,2527  55'563 1          TS    TESTNO      INITIALIZE FOR TEST ABORT ROUTINE
0350  REF   1            24,2530  55'615 0          TS    CDUFLAG     ZEROS FOR STRTWACH USE
0351  REF   1            24,2531  3 3637 0           CAF   SFCONST
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0352  REF   1                24,2532  55,623  0                TS      SECONST1       FOR DIVISION DURING CALCSFE

0353  REF  76 LAST 417       24,2533  0 5206  0                TC      BANKCALL
0354  REF   5 LAST 415       24,2534   26000  0                CADR    IMUZERO
0355  REF  77 LAST 419       24,2535  0 5206  0                TC      BANKCALL
0356  REF  18 LAST 415       24,2536   26751  0                CADR    IMUSTALL
0357  REF  10 LAST 418       24,2537  1 2250  0                TCF     ENDTEST1
0358  REF   3 LAST 415       24,2540  0 3353  1                TC      NBPOSPL
0359  REF   3 LAST 415       24,2541  0 3104  1                TC      POSSMBL
0360  REF  11 LAST 419       24,2542  1 2250  0                TCF     ENDTEST1
0361  REF   3 LAST 415       24,2543  0 3133  0                TC      FALNF
0362  REF  78 LAST 419       24,2544  0 5206  0                TC      BANKCALL
0363  REF   1                24,2545   31726  0                CADR    REDYTORK
0364  REF   3 LAST 413       24,2546  55,552  0  WAITFIVE      TS      SOUTHDR
0365  REF  26 LAST 405       24,2547  3 7756  1                CAF     BIT6           THIS SECTION CALLS FOR 2-32 MSEC WAITS
0366  REF   1                24,2550  0 2563  0                TC      DIRECTN -5
0367  REF  27 LAST 419       24,2551  3 7756  1  ENABLE        CAF     BIT6
0368                         24,2552  0 0006  1                EXTEND                 ENABLE GYRO TORQUING LOOP BY TURNING
0369  REF   1                24,2553  05 014  1                WOR     14C            ON CAL MODULE RELAY

0370                         24,2554  0 0004  0                INHINT
0371  REF  54 LAST 418       24,2555  4 7762  1                CS      TWO            SETS UP EXEC SWITCH SO IMUPULSE WILL
0372  REF  17 LAST 311       24,2556  7 0366  0                MASK    IMODES33       NOT TURN OFF GYRO TORQ ENABLE RELAY
0373  REF  55 LAST 419       24,2557  6 7762  0                AD      TWO
0374  REF  18 LAST 419       24,2560  54 366  0                TS      IMODES33
0375  REF  56 LAST 419       24,2561  3 7762  0                CAF     TWO
0376  REF   4 LAST 419       24,2562  55,552  0                TS      SOUTHDR
0377  REF   4 LAST 416       24,2563  55,527  1                TS      LENGTHOT       20 MSEC DELAY FOR GYRO LOOP STABILIZAT.
0378  REF 113 LAST 418       24,2564  3 7763  1                CA      ONE
0379  REF   4 LAST 416       24,2565  0 3214  0                TC      WAITLOOP
0380  REF   4 LAST 416       24,2566  11,676  0                CCS     COUNTPL
0381  REF   4 LAST 416       24,2567  0 3236  0                TC      WAITLP2
0382  REF  79 LAST 419       24,2570  0 5206  0  DIRECTN        TC      BANKCALL       TORQUING ROUTINE IN IMU PERFORMANCE
0383  REF   1                24,2571   46520  1                CADR    SILVER           BANK 3
0384  REF   5 LAST 419       24,2572  11,552  0                CCS     SOUTHDR        A ONE FIRST TIME THROUGH, THEN ZERO
0385  REF   1                24,2573  0 2546  1                TC      WAITFIVE

0386  REF   2 LAST 418       24,2574  11,615  0  STRTWACH      CCS     CDUFLAG        RETURNS HERE VIA QPLACE FROM SILVER
0387  REF   1                24,2575  0 2656  0                TC      CDUZNTST       BEEN CAUGHT AND CDU THROUGH ZERO IS
0388  REF   3 LAST 418       24,2576  11,621  1                CCS     SAVE +1
0389  REF   1                24,2577  0 2616  1                TC      LOOKCDUP -4
0390  REF   2 LAST 419       24,2600  0 2622  0                TC      LOOKCDUP
0391  REF 135 LAST 418       24,2601  3 7767  0  CORRECT       CAF     ZERO
0392  REF  10 LAST 153       24,2602  54 356  0                TS      LGYRO          RELEASES GYROS FOR IMUPULSE USAGE
0393  REF  30 LAST 419       24,2603  0 5206  0                TC      BANKCALL       EARTHRATE CORRECTION TO GYROS NOT EAST
0394  REF   6 LAST 413       24,2604   30424  0                CADR    EARTHR         OR WEST
0395  REF 114 LAST 419       24,2605  3 7763  1                CAF     ONE
0396  REF  11 LAST 419       24,2606  54 356  0                TS      LGYRO          RESERVES GYROS FOR S.F. TEST TORQUING
0397  REF   4 LAST 419       24,2607  55,622  1                TS      SAVE +2        INITIALIZES TO INSURE 5.6 DEG OF TORQ)
0398  REF   2 LAST 418       24,2610  27,563  1                ADS     TESTNO         INCR THE BURST COUNTER, WHICH IS USED TO
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0399  REF   3 LAST 419   24,2611  4 1563 1            CS    TESTNO     COUNT THE NO. OF TIMES THE GYRO COUNTER
0400  REF  11 LAST 413   24,2612  7 7766 0            MASK  FIVE       IS LOADED. IF A TENTH LOAD IS REQUESTED
0401                     24,2613  0 0006 1            EXTEND           THE SFE IS TOO LARGE TO BE MEANINGFULL
0402  REF   1            24,2614  1 2765 0            BZF   STOPTEST   OR THE CDU,S ARE NOT WORKING.
0403  REF   2 LAST 419   24,2615  0 2570 1            TC    DIRECTN

0404  REF 136 LAST 419   24,2616  3 7767 0            CAF   ZERO       ZEROS CDU REG WHICH WILL BE USED TO
0405  REF   5 LAST 419   24,2617  55'621 1            TS    SAVE +1
0406  REF   6 LAST 415   24,2620  51'672 0            INDEX CDUNDX     MEASURE ANGLE.
0407  REF  16 LAST 415   24,2621  54 032 1            TS    CDUX
0408                     24,2622  0 0004 0  LOOKCDUP  INHINT
0409  REF  17 LAST 398   24,2623  3 7757 0            CAF   BIT5
0410  REF   1            24,2624  55'624 1  STILLOOK  TS    TIMER
0411  REF   7 LAST 420   24,2625  51'672 0            INDEX CDUNDX     LOOKS FOR FIRST CDU PULSE AFTER TORQUING
0412  REF  17 LAST 420   24,2626  10 032 1            CCS   CDUX       STARTS
0413  REF   1            24,2627  0 2641 0            TC    OUTPLUS    HERE IS PLUS PULSE
0414  REF   1            24,2630  0 2633 0            TC    TIMEWACH
0415  REF   4 LAST 417   24,2631  0 2444 1            TC    ALARMS     TTELL OPERATOR FIRST CDU PULSE WAS MISSD
0416  REF   1            24,2632  0 2652 1            TC    OUTNEG     HERE IS MINUS PULSE
0417  REF   2 LAST 420   24,2633  11'624 1  TIMEWACH  CCS   TIMER      WATCHES TIME IN INHINT SO COPS WILL NOT
0418  REF   1            24,2634  0 2624 0            TC    STILLOOK   CATCH US
0419                     24,2635  0 0003 1            RELINT

0420  REF   3 LAST 224   24,2636  10 067 1            CCS   NEWJOB
0421  REF   2 LAST 224   24,2637  0 5532 0            TC    CHANG1
0422  REF   3 LAST 419   24,2640  0 2622 0            TC    LOOKCDUP   KEEP WATCHING IF THE PULSE IS NOT HERE

0423  REF   1            24,2641  4 3636 0  OUTPLUS   CS    DESANGLE   -2047 CDU PULSES ADDED TO CDU REG SO
0424  REF   8 LAST 420   24,2642  51'672 0            INDEX CDUNDX     ZERO CROSSOVER CAN BE DETECTED
0425  REF  18 LAST 420   24,2643  54 032 1            TS    CDUX
0426  REF 115 LAST 419   24,2644  3 7763 1  LOADFLAG  CAF   ONE
0427  REF   3 LAST 419   24,2645  55'615 0            TS    CDUFLAG
0428  REF   1            24,2646  3 0047 1            CA    GYROCTR    GYRO TORQ CMDS LEFT OUT OF FIRST 5.625
0429  REF   6 LAST 420   24,2647  55'620 0            TS    SAVE       DEG COMMANDED WHEN CDU PULSE ARRIVED
0430                     24,2650  0 0003 1            RELINT
0431  REF   2 LAST 419   24,2651  0 2656 0            TC    CDUZOTST

0432  REF   2 LAST 420   24,2652  3 3636 1  OUTNEG    CA    DESANGLE
0433  REF   9 LAST 420   24,2653  51'672 0            INDEX CDUNDX
0434  REF  19 LAST 420   24,2654  54 032 1            TS    CDUX
0435  REF   1            24,2655  0 2644 0            TC    LOADFLAG

0436  REF  10 LAST 420   24,2656  51'672 0  CDUZOTST  INDEX CDUNDX
0437  REF  20 LAST 420   24,2657  10 032 1            CCS   CDUX
0438                     24,2660  0 2664 1            TC    +4
0439  REF   1            24,2661  0 2701 0            TC    ENDWATCH
0440                     24,2662  0 2664 1            TC    +2
0441  REF   2 LAST 420   24,2663  0 2701 0            TC    ENDWATCH
0442  REF  33 LAST 412   24,2664  3 7752 0            CAF   BIT10      RAND WITH BIT 10 TO SEE IF STILL TORQ.
0443                     24,2665  0 0006 1            EXTEND
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0444   REF   2 LAST 419    24,2666   02 014 0            RAND    14C
0445   REF 220 LAST 418    24,2667   10 000 0            CCS     A
0446                       24,2670   0 2676 1            TC      +6

0447   REF   7 LAST 420    24,2671   11'622 1            CCS     SAVE +2     SEE IF 2.8DEG OR 5.6 DEG SINCE LAST
0448                       24,2672   0 2674 0            TC      +2          EEARTHR USE. IF 2.8 DEG, DO 2.8 MORE
0449   REF   1             24,2673   0 2601 1            TC      CORRECT       THEN GO TO CORRECT
0450   REF   8 LAST 421    24,2674   55'622 1            TS      SAVE +2
0451   REF   3 LAST 420    24,2675   0 2570 1            TC      DIRECTN
0452   REF   4 LAST 420    24,2676   10 067 1            CCS     NEWJOB
0453   REF   3 LAST 420    24,2677   0 5532 0            TC      CHANG1
0454   REF   3 LAST 420    24,2700   0 2656 0            TC      CDUZNTST

0455                       24,2701   0 0004 0  ENDWATCH  INHINT                WWILL STOR GYROCTR AT END OF 2048 CDU
0456   REF 137 LAST 420    24,2702   3 7767 0            CAF     ZERO        PULSES AND STOP TORQ BY ZEROING REQUESTS
0457   REF  12 LAST 419    24,2703   54 356 0            TS      LGYRO         RELEASE GYROS FOR OTHERS USAGE
04575  REF   5 LAST 216    24,2704   6 7770 0            AD      NEGO        PREVENT +0 IN OUTPUT COUNTER
0458   REF   2 LAST 420    24,2705   56 047 1            XCH     GYROCTR
0459   REF   9 LAST 421    24,2706   55'621 1            TS      SAVE +1     AND STOPS TORQUING BY ZEROING TORQ
0460   REF  57 LAST 419    24,2707   4 7762 1            CS      TWO
0461   REF  19 LAST 419    24,2710   7 0366 0            MASK    IMODFS33    THIS TURNS OFF EXEC SWITCH SO THE GYRO
0462   REF  20 LAST 421    24,2711   54 366 0            TS      IMODFS33    TORQ. ENABLE RELAY CAN BE TURNED OFF.
0463                       24,2712   0 0003 1            RELINT
0464   REF  10 LAST 421    24,2713   3 1620 1  CALCSFE   CA      SAVE        GYROCTR AT TEST START
0465                       24,2714   0 0006 1            EXTEND
0466   REF  11 LAST 421    24,2715   61'621 0            SU      SAVE +1     GYROCTR AT TEST END
0467   REF  12 LAST 421    24,2716   55'622 1            TS      SAVE +2
0468                       24,2717   0 0006 1            EXTEND
0469   REF   1             24,2720   6 2737 0            BZMF    ARITH       SEE IF IT IS NEG OR ZERO,IF NEG,SFE IS +
0470   REF   1             24,2721   7 3640 1            MASK    SIZCHK
0471                       24,2722   0 0006 1            EXTEND              THIS ROUTINE TESTS SAVE-(SAVE+1) TO SEE
0472   REF   1             24,2723   1 2731 1            BZF     NEGSFE      IF THE RESULT IS WITHIN PERMISSIBLE SIZE
0473   REF  13 LAST 421    24,2724   4 1622 1            CS      SAVE +2     AND DETERMINES POLARITY OF SFE USING THE
0474   REF   2 LAST 421    24,2725   7 3640 1            MASK    SIZCHK      PRESENCE OR ABSENCE OF BITS 12,13,14.
0475                       24,2726   0 0006 1            EXTEND              IF BITS ARE PRESENT IN POSITIVE SAVE +2
0476   REF   1             24,2727   1 2733 0            BZF     POSSFE      THEN THE SFE MUST BE POS. IF DIFFERENCE
0477   REF   2 LAST 420    24,2730   0 2765 1            TC      STOPTEST    IS GREATER THAN 2047 PULSES FROM THE
0478   REF  14 LAST 421    24,2731   31'622 0  NEGSFE   CAE     SAVE +2     IDEAL NO OF PULSES, THE SFE EXCEEDS
0479   REF   2 LAST 421    24,2732   0 2737 0            TC      ARITH       15600 PPM, THE TEST IS NOT VALID AND

R0480  THEREFORE ABORTS AND TURNS ON PROGRAM ALARM
0481   REF  19 LAST 414    24,2733   3 7743 0  POSSFE   CAF     POSMAX      POS SFE DEFINITION = IRIG SF IN SEC OF
0482                       24,2734   0 0006 1            EXTEND              ARC PER PULSE IS GREATER THAN
0483   REF  15 LAST 421    24,2735   61'622 0            SU      SAVE +2     .61798095703125  SEC OF ARC/ PULSE
0484   REF   3 LAST 421    24,2736   0 2740 0            TC      ARITH +1

0485                       24,2737   4 0000 0  ARITH    COM
0486                       24,2740   22 007 0            ZL
0487                       24,2741   0 0006 1            EXTEND
0488   REF   2 LAST 419    24,2742   11'623 0            DV      SFCONST1
```

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```
0489  REF  20 LAST 414   24,2743  54 342 0  LOADIT   TS    DSPTEM2
0490  REF   1            24,2744  0 2745 0           TC    DATADSP

0491  REF   2 LAST 314   24,2745  0 4632 1  DATADSP  TC    GRABDSP
0492  REF   2 LAST 306   24,2746  0 4637 1           TC    PREGBSY
0493  REF   3 LAST 418   24,2747  3 1614 0           CA    CALCDIR
0494  REF  21 LAST 422   24,2750  54 344 0           TS    DSPTEM2 +2      DISPLAYS TEST NO JUST PERFORMED
0495  REF   1            24,2751  3 3643 0           CAF   VB06N66         R3 = TEST NO JUST PERFORMED
0496  REF  46 LAST 418   24,2752  0 4657 1           TC    NVSBWAIT
0497  REF  11 LAST 417   24,2753  0 4622 0           TC    FLASHON
0498  REF  34 LAST 418   24,2754  0 4475 0           TC    ENDIDLE         TO END TEST DO V34E
0499                     24,2755  0 2757 0           TC    +2
0500  REF   4 LAST 418   24,2756  0 2455 1           TC    TESTCALL        TO CONTINUE TEST DO V33E
0501  REF  81 LAST 419   24,2757  0 5206 0           TC    BANKCALL
0502  REF   6 LAST 419   24,2760   26000 0           CADR  IMJZERO
0503  REF  82 LAST 422   24,2761  0 5206 0           TC    BANKCALL
0504  REF  19 LAST 419   24,2762   26751 0           CADR  IMJSTALL
0505  REF  12 LAST 419   24,2763  1 2250 0           TCF   ENDTEST1
0506  REF  13 LAST 422   24,2764  1 2250 0           TCF   ENDTEST1

0507  REF  83 LAST 422   24,2765  0 5206 0  STOPTEST TC    BANKCALL
0508  REF   7 LAST 422   24,2766   26000 0           CADR  IMJZERO
0509  REF  84 LAST 422   24,2767  0 5206 0           TC    BANKCALL        CORRECT CDUCTRS AND TURN ON PROG ALARM
0510  REF  20 LAST 422   24,2770   26751 0           CADR  IMJSTALL        TO TELL OPERATOR LAST CDU PULSE WAS
0511  REF  14 LAST 422   24,2771  1 2250 0           TCF   ENDTEST1        MISSED OR GYRO TORQ LOOP WAY OUT OF
0512  REF 138 LAST 421   24,2772  3 7767 0           CAF   ZERO            ALLOWABLE LIMITS.........
05122 REF  13 LAST 421   24,2773  54 356 0           TS    LGYRO           **** RELEASE GYROS FOR OTHERS USAGE*****
05126 REF   5 LAST 420   24,2774  0 2444 1           TC    ALARMS
0513  REF  15 LAST 422   24,2775  1 2250 0           TCF   ENDTEST1
```

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```
0514                        24,2776  0 0006 1  CHECKG   EXTEND          PIP PULSE CATCHING ROUTINE
0515  REF  27 LAST 417      24,2777  23'546 1            QXCH   QPLACE   RECORDS TIME AT OCCURRENCE OF A DELTA V
0516                        24,3000  0 0003 1  CHECKG1  RELINT          KEEPS CONTENT OF PIPA REG INTACT
0517  REF   5 LAST 421      24,3001  10 067 1            CCS    NEWJOB
0518  REF   4 LAST 421      24,3002  0 5532 0            TC     CHANG1
0519                        24,3003  0 0004 0            INHINT
0520  REF 139 LAST 422      24,3004  3 7767 0            CAF    ZERO
0521  REF   7 LAST 416      24,3005  51'541 0            INDEX  PIPINDEX
0522  REF   9 LAST 416      24,3006  56 037 0            XCH    PIPAX
0523  REF   7 LAST 415      24,3007  55'551 0            TS     STOREPL
0524  REF   8 LAST 423      24,3010  11'551 0            CCS    STOREPL
0525  REF   1               24,3011  0 3015 0            TC     CHECKP
0526  REF   1               24,3012  0 3070 0            TC     RESTOREA
0527  REF   1               24,3013  0 3030 1            TC     CHECKM
0528  REF   2 LAST 423      24,3014  0 3070 0            TC     RESTOREA
0529  REF  28 LAST 419      24,3015  3 7756 1  CHECKP   CAF    BIT6        LOOKS FOR ONE MORE PLUS PULSE
0530  REF   1               24,3016  55'540 0            TS     PIPANO
0531  REF   8 LAST 423      24,3017  51'541 0            INDEX  PIPINDEX
0532  REF  10 LAST 423      24,3020  10 037 1            CCS    PIPAX
0533  REF   1               24,3021  0 3043 0            TC     CHECKG3
0534                        24,3022  0 3025 0            TC     +3
0535  REF   3 LAST 423      24,3023  0 3070 0            TC     RESTOREA
0536                        24,3024  0 3025 0            TC     +1
0537  REF   2 LAST 423      24,3025  11'540 0            CCS    PIPANO
0538  REF   2 LAST 423      24,3026  0 3016 0            TC     CHECKP +1
0539  REF   4 LAST 423      24,3027  0 3070 0            TC     RESTOREA
0540  REF  29 LAST 423      24,3030  3 7756 1  CHECKM   CAF    BIT6        LOOKS FOR ONE MORE MINUS PULSE
0541  REF   3 LAST 423      24,3031  55'540 0            TS     PIPANO
0542  REF   9 LAST 423      24,3032  51'541 0            INDEX  PIPINDEX
0543  REF  11 LAST 423      24,3033  10 037 1            CCS    PIPAX
0544  REF   5 LAST 423      24,3034  0 3070 0            TC     RESTOREA
0545                        24,3035  0 3040 0            TC     +3
0546  REF   2 LAST 423      24,3036  0 3043 0            TC     CHECKG3
0547                        24,3037  0 3040 0            TC     +1
0548  REF   4 LAST 423      24,3040  11'540 0            CCS    PIPANO
0549  REF   2 LAST 423      24,3041  0 3031 0            TC     CHECKM +1
0550  REF   6 LAST 423      24,3042  0 3070 0            TC     RESTOREA
0551  REF   5 LAST 410      24,3043  0 5026 0  CHECKG3   TC     FINETIME    TIME IN DOUBLE PRECISION LEFT IN MPAC

0552  REF 232 LAST 407      24,3044  52 145 0            DXCH   MPAC
0553  REF  26 LAST 406      24,3045  3 7760 1            CAF    BIT4
0554  REF   5 LAST 423      24,3046  55'540 0  CHECKG5   TS     PIPANO
0555  REF  10 LAST 423      24,3047  51'541 0            INDEX  PIPINDEX
0556  REF  12 LAST 423      24,3050  10 037 1            CCS    PIPAX
0557                        24,3051  0 3055 1            TC     +4
0558  REF   7 LAST 423      24,3052  0 3070 0            TC     RESTOREA
0559                        24,3053  0 3055 1            TC     +2
0560  REF   8 LAST 423      24,3054  0 3070 0            TC     RESTOREA
0561  REF   6 LAST 423      24,3055  11'540 0            CCS    PIPANO
0562  REF   1               24,3056  0 3046 0            TC     CHECKG5
```

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```
0563  REF   1              24,3057  0 3062 0  NREAD    TC     RESTORE
0564  REF   9 LAST 423     24,3060  55'551 0           TS     STOREPL
0565  REF  28 LAST 423     24,3061  0 1546 1           TC     OPLACE
0566  REF  10 LAST 424     24,3062  57'551 1  RESTORE  XCH    STOREPL   A WILL CONTAIN PREVIOUS PIPA CNTR CONTEN
0567  REF  11 LAST 423     24,3063  51'541 0           INDEX  PIPINDEX  STOREPL WILL CONTAIN ZERO
0568  REF  13 LAST 423     24,3064  6 0037 0           AD     PIPAX
0569  REF  12 LAST 424     24,3065  51'541 0           INDEX  PIPINDEX
0570  REF  14 LAST 424     24,3066  54 037 1           TS     PIPAX
0571  REF 157 LAST 417     24,3067  0 0002 0           TC     Q
```

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```
0572  REF   2 LAST 424   24,3070  0 3062 0  RESTOREA  TC      RESTORE
0573  REF   1           24,3071  0 3000 1            TC      CHECKG1
0574  REF  11 LAST 424   24,3072  3 1551 1  DATALD    CA      S1OREPL
0575  REF  12 LAST 416   24,3073  51'673 1            INDEX   RESJITCT
0576  REF  12 LAST 416   24,3074  55'626 0            TS      DATAPL
0577  REF 233 LAST 423   24,3075  3 0144 0            CA      MPAC
0578  REF  13 LAST 425   24,3076  51'673 1            INDEX   RESJITCT
0579  REF  13 LAST 425   24,3077  55'627 1            TS      DATAPL +1
0580  REF 234 LAST 425   24,3100  3 0145 1            CA      MPAC +1
0581  REF  14 LAST 425   24,3101  51'673 1            INDEX   RESJITCT
0582  REF  14 LAST 425   24,3102  55'630 1            TS      DATAPL +2
0583  REF 158 LAST 424   24,3103  0 0002 0            TC      Q


0584                     24,3104  0 0006 1  POSGMBL   EXTEND                  COARSE ALIGNING SUBROUTINE
0585  REF  29 LAST 424   24,3105  23'546 1            DXCH    QPLACE

0586  REF  37 LAST 418   24,3106  0 6112 0            TC      INTPRET
0587                     24,3107   77624 1            CALL
0588  REF   2 LAST 385   24,3110   32655 0                    CALCGA
0589                     24,3111   77776 1            EXIT

0590  REF  85 LAST 422   24,3112  0 5206 0            TC      BANKCALL
0591  REF   4 LAST 411   24,3113   26065 0            CADR    IMUCOARS
0592  REF  10 LAST 315   24,3114  3 0075 0            CA      FLAGWRD1
0593  REF  13 LAST 415   24,3115  7 7754 1            MASK    BIT8
0594  REF 221 LAST 421   24,3116  10 000 0            CCS     A                L +1, OTHERWISE TO L +2.
0595  REF   1           24,3117  0 3122 0            TC      LOCK
0596  REF  30 LAST 425   24,3120  25'546 1            INCR    QPLACE
0597                     24,3121  0 3124 0            TC      +3
0598  REF  58 LAST 421   24,3122  3 7762 0  LOCK      CA      TWO
0599  REF  26 LAST 413   24,3123  55'537 0            TS      NDXCTR
05991 REF   5 LAST 102   24,3124  0 6067 0            TC      FLAG1DWN
059912                   24,3125   00200 0            OCT     200
0600  REF  86 LAST 425   24,3126  0 5206 0            TC      BANKCALL
0601  REF  21 LAST 422   24,3127   26751 0            CADR    IMUSTALL
0602  REF  16 LAST 422   24,3130  1 2250 0            TCF     ENDTEST1
0603  REF  31 LAST 425   24,3131  0 1546 1            TC      QPLACE
0604                     24,3132   00401 1  GMLOCKCK  OCT     00401
```

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```
0606                          24,3133  0 0006 1  FALNE   EXTEND          TORQUES GYROS TO NULL OVT DIFFERENCE
0607  REF  32 LAST 425        24,3134  23,546 1          DXCH    DPLACE  BETWEEN DESIRED SM ORIENTATION WITH RESP
0608  REF  37 LAST 425        24,3135  0 5206 0          TC      BANKCALL TO NBASE AND ACTUAL
0609  REF   8 LAST 422        24,3136   26000 0          CADR    IMUZERO
0610  REF  38 LAST 426        24,3137  0 5206 0          TC      BANKCALL
0611  REF  22 LAST 425        24,3140   26751 0          CADR    IMUSTALL
0612  REF  17 LAST 425        24,3141  1 2250 0          TCF     ENDTEST1
0613  REF  39 LAST 426        24,3142  0 5206 0          TC      BANKCALL
0614  REF   4 LAST 397        24,3143   26252 0          CADR    IMUFINE
0615  REF  30 LAST 426        24,3144  0 5206 0          TC      BANKCALL
0616  REF  23 LAST 426        24,3145   26751 0          CADR    IMUSTALL
0617  REF  18 LAST 426        24,3146  1 2250 0          TCF     ENDTEST1
0618  REF  21 LAST 420        24,3147  3 0032 0  FALNE1   CA      CDUX
0619  REF  14 LAST 407        24,3150  50 110 1          INDEX   FIXLOC
0620                          24,3151  54 024 0          TS      24
0621  REF  11 LAST 398        24,3152  3 0033 1          CA      CDUY
0622  REF  15 LAST 426        24,3153  50 110 1          INDEX   FIXLOC
0623                          24,3154  54 020 1          TS      20
0624  REF   9 LAST 398        24,3155  3 0034 0          CA      CDUZ
0625  REF  16 LAST 426        24,3156  50 110 1          INDEX   FIXLOC
0626                          24,3157  54 022 0          TS      22
0627  REF  18 LAST 420        24,3160  3 7757 0          CA      BIT5
0628  REF  17 LAST 426        24,3161  6 0110 1          AD      FIXLOC
0629  REF  18 LAST 426        24,3162  50 110 1          INDEX   FIXLOC
0630  REF  13 LAST 398        24,3163  54 050 0          TS      S1
0631  REF  38 LAST 425        24,3164  0 6112 0          TC      INTPRET
0632                          24,3165   64375 1          VLOAD   MXV
0633  REF  42 LAST 414        24,3166   02401 0                  XSM
0634  REF  36 LAST 397        24,3167   02445 0                  STADR
0635                          24,3170   77772 0          VSL1
0636                          24,3171   34041 0          STCALL  32D
0637  REF   7 LAST 385        24,3172   32555 0                  NBSM
0638  REF  15 LAST 385        24,3173   26423 0          STOVL   XDC
0639  REF  13 LAST 414        24,3174   02407 0                  YSM
0640                          24,3175   76521 0          MXV     VSL1
0641  REF  37 LAST 426        24,3176   02445 0                  STADR
0642                          24,3177   34041 0          STCALL  32D
0643  REF   8 LAST 426        24,3200   32555 0                  NBSM
0644  REF   5 LAST 385        24,3201   26431 0          STOVL   YDC
0645  REF  16 LAST 426        24,3202   02423 0                  XDC
0646                          24,3203   76435 1          VXV     VSL1
0647  REF   6 LAST 426        24,3204   02431 0                  YDC
0648  REF   4 LAST 385        24,3205   36437 1          STCALL  ZDC
0649  REF   2 LAST 385        24,3206   32425 0                  CALCGTA
0650                          24,3207   77776 1          EXIT
0651  REF   1                 24,3210  3 3657 0          CA      DGCPI
0652  REF  31 LAST 426        24,3211  0 5206 0          TC      BANKCALL
0653  REF   3 LAST 364        24,3212   26362 1          CADR    IMUPULSE
0654  REF  33 LAST 426        24,3213  0 1546 1          TC      DPLACE
```

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```
0655                          24,3214  0 0006 1  WAITLOOP  EXTEND                LOOPS IN X SEC INCREMENTS FOR NUMBER OF
0656  REF    5 LAST 392       24,3215  23'545 1            DXCH    QPLAC
0657  REF    5 LAST 419       24,3216  55'676 0            TS      COUNTPL          NUMBER PUT INTO LENGTHOT
0658  REF    6 LAST 427       24,3217  11'676 0  WAITLP1   CCS     COUNTPL
0659                          24,3220  0 3224 0            TC      +4
0660  REF    6 LAST 427       24,3221  0 1545 1            TC      QPLAC
0661                          24,3222  0 3224 0            TC      +2
0662  REF    1                24,3223  0 3216 1            TC      WAITLP1 -1
0663                          24,3224  0 0004 0            INHINT
0664  REF    5 LAST 419       24,3225  31'527 0            CAE     LENGTHOT
0665  REF   53 LAST 406       24,3226  0 5663 1            TC      WAITLIST
06655 REF   43 LAST 426                  E5                EBANK=  XSM
0666                          24,3227   03242 0            2CADR   WAITLP3
C0666 REF    1                24,3230   50065 1
0667                          24,3231  0 0003 1            RELINT
0668  REF    7 LAST 427       24,3232  11'676 0            CCS     COUNTPL
0669  REF    7 LAST 427       24,3233  0 1545 1            TC      QPLAC
0670  REF    8 LAST 427       24,3234  0 1545 1            TC      QPLAC
0671                          24,3235  1 3236 1            NOOP
0672  REF    8 LAST 427       24,3236  55'676 0  WAITLP2   TS      COUNTPL          ENTER HERE AFTER DOING CALLING JOB
0673  REF    1                24,3237  3 3241 0            CAF     WTLPCADR
0674  REF   11 LAST 406       24,3240  0 5545 0            TC      JOBSLEEP
0675  REF    2 LAST 427       24,3241   51217 1  WTLPCADR  CADR    WAITLP1
0676  REF    2 LAST 427       24,3242  3 3241 0  WAITLP3   CAF     WTLPCADR
0677  REF    9 LAST 405       24,3243  0 5551 0            TC      JOBWAKE
0678  REF   51 LAST 406       24,3244  0 5727 0            TC      TASKOVER


0679  REF   81 LAST 410       24,3245  54 001 1  ZEROING   TS      L
0680                          24,3246  1 3250 1            TCF     +2
0681  REF    3 LAST 415       24,3247  55'777 0  ZEROING1  TS      ZERONDX
0682  REF  140 LAST 423       24,3250  3 7767 0            CAF     ZERO
0683  REF   82 LAST 427       24,3251  50 001 0            INDEX   L
0684                          24,3252  54 000 0            TS      0
0685  REF   83 LAST 427       24,3253  24 001 0            INCR    L
0686  REF    4 LAST 427       24,3254  11'777 0            CCS     ZERONDX
0687  REF    1                24,3255  1 3247 1            TCF     ZEROING1
0688  REF  159 LAST 425       24,3256  0 0002 0            TC      Q
0689  REF   39 LAST 426       24,3257  0 6112 0  COMPUT    TC      INTPRET          CALCULATE LENGTH OF GRAVITY VECTOR AS
0690                          24,3260   77170 1            AXT,1   AXT,2             MEASURED BY ACCELEROMETERS
0691                          24,3261   00026 0                    22D
0692                          24,3262   00012 1                    10D
0693                          24,3263   77731 1            SSP
0694  REF   14 LAST 426       24,3264   00051 0                    S1
0695                          24,3265   00004 0                    4
0696                          24,3266   77731 1            SSP
0697  REF   13 LAST 387       24,3267   00052 0                    S2
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```
0698                          24,3270   00004 0                    4
0699                          24,3271   44743 1  LOPDELOP  DLOAD*  DSU*
0700  REF  15 LAST 425        24,3272   75120 0                    DATAPL +24D,2
0701  REF  16 LAST 428        24,3273   02657 1                    DATAPL +24D,1
0702                          24,3274   41323 0           PDDL*    DMP
0703  REF  46 LAST 416        24,3275   75156 1                    GENPL +24D,2
0704  REF   2 LAST 413        24,3276   11651 0                    DEC5B5
0705                          24,3277   77671 1           DDV
0706                          24,3300   55504 0           TIX,2    VDEF
0707  REF   1                 24,3301   51306 0                    NEXT
0708                          24,3302   47046 0           ABVAL    RTB
0709  REF   4 LAST 413        24,3303   33520 0                    SGNAGREE
0710  REF  22 LAST 422        24,3304   34343 1           STCALL   DSPTEM2
0711  REF   1                 24,3305   51310 1                    KODU
0712                          24,3306   60006 1  NEXT     PUSH     TIX,1
0713  REF   1                 24,3307   51271 1                    LOPDELOP
0714                          24,3310   77776 1  KODU     EXIT
0715  REF  15 LAST 400        24,3311  0 4644 0           TC       GRABWAIT
0716  REF   5 LAST 414        24,3312  0 3605 1           TC       SHOW
0717  REF  40 LAST 427        24,3313  0 6112 0           TC       INTPRET
0718                          24,3314   41535 1           SLOAD    PUSH
0719  REF  17 LAST 428        24,3315   02630 0                    DATAPL +1
0720                          24,3316   41535 1           SLOAD    PUSH
0721  REF  18 LAST 428        24,3317   02634 1                    DATAPL +5
0722                          24,3320   55535 1           SLOAD    VDEF
0723  REF  19 LAST 428        24,3321   02640 1                    DATAPL +11
0724                          24,3322   76456 1           UNIT     VSL1
0725                          24,3323   77606 1           PUSH
0726                          24,3324   41535 1           SLOAD    PUSH
0727  REF  20 LAST 428        24,3325   02644 0                    DATAPL +15
0728                          24,3326   41535 1           SLOAD    PUSH
0729  REF  21 LAST 428        24,3327   02650 0                    DATAPL +21
0730                          24,3330   55535 1           SLOAD    VDEF
0731  REF  22 LAST 428        24,3331   02654 1                    DATAPL +25
0732                          24,3332   76456 1           UNIT     VSL1
0733                          24,3333   45325 1           PDDL     DSU
0734  REF  23 LAST 428        24,3334   02655 0                    DATAPL +26
0735  REF  24 LAST 428        24,3335   02641 0                    DATAPL +17
0736                          24,3336   77612 1           SL4
0737                          24,3337   77652 0           SL3
0738  REF   6 LAST 427        24,3340   26530 0           STODL    LENGTHOT
0739                          24,3341   51435 1           VXV      ABVAL
0740                          24,3342   56205 0           DMP      DDV
0741  REF   1                 24,3343   11654 0                    ERUNITS
0742  REF   7 LAST 428        24,3344   02530 0                    LENGTHOT
0743                          24,3345   77634 0           RTB
0744  REF   5 LAST 428        24,3346   33520 0                    SGNAGREE
0745  REF  23 LAST 428        24,3347   00343 0           STORE    DSPTEM2
0746                          24,3350   77776 1           EXIT
0747  REF   6 LAST 428        24,3351  0 3605 1           TC       SHOW
```

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```
0748  REF   1                 24,3352  1 2407 1            ICF     RADCK
0749                          24,3353  0 0006 1  NBPOSPL    EXTEND
0750  REF  34 LAST 426        24,3354  23'546 1            QXCH    QPLACE      SETS UP AZIMUTH AND VERTICAL VECTORS FOR
0751  REF  41 LAST 428        24,3355  0 6112 0            TC      INTPRET     AXISGEN,RESULTS TO BE USED IN CALCGA TO
0752                          24,3356  54160 1             AXC,1   XSU,1       AZIMUTH IN NB COORDS
0753  REF   1                 24,3357  51670 1                     SCNBAZ
0754  REF   2 LAST 418        24,3360  02536 0                     NBPOS
0755                          24,3361  77773 1             VLOAD*
0756                          24,3362  00001 0                     0,1
0757  REF  38 LAST 426        24,3363  02445 0             STORE   STARAD

0758                          24,3364  54160 1             AXC,1   XSU,1       VERTICAL IN NB COORDS
0759  REF   1                 24,3365  51702 0                     SCNBVER
0760  REF   3 LAST 429        24,3366  02536 0                     NBPOS
0761                          24,3367  77773 1             VLOAD*
0762                          24,3370  00001 0                     0,1
0763  REF  39 LAST 429        24,3371  16453 1             STODL   STARAD +6
0764  REF   1                 24,3372  33300 1                     SCHZFROS
0765                          24,3373  14007 0             STODL   6D
0766  REF   5 LAST 392        24,3374  02507 1                     AZIMUTH
0767                          24,3375  57546 1             COS     DCOMP
0768                          24,3376  14011 1             STODL   8D
0769  REF   6 LAST 429        24,3377  02507 1                     AZIMUTH
0770                          24,3400  77756 0             SIN
0771                          24,3401  00013 0             STORE   10D         VERTICAL IN CER
0772                          24,3402  77775 1             VLOAD
0773  REF   2 LAST 429        24,3403  11703 0                     SCNBVER
0774                          24,3404  34015 1             STCALL  12D
0775  REF   2 LAST 384        24,3405  32741 1                     AXISGEN
0776                          24,3406  77776 1             EXIT

0777  REF   2 LAST 412        24,3407  3 3647 1  SELPOSN    CA      DEC17
0778  REF   5 LAST 427        24,3410  55'777 0            TS      ZERONDX
0779  REF   1                 24,3411  3 3667 0            CA      XSMADR
0780  REF   3 LAST 415        24,3412  0 3245 1            TC      ZEROING

0781  REF  12 LAST 418        24,3413  51'544 0            INDEX   POSITON
0782                          24,3414  0 3415 1            TC      +1
0783  REF   1                 24,3415  0 3533 1            TC      OPCHKPOS    OPCHK WILL PUT ZERO IN POSITON
0784  REF   1                 24,3416  0 3431 1            TC      POSN1
0785  REF   1                 24,3417  0 3440 1            TC      POSN2
0786  REF   1                 24,3420  0 3445 1            TC      POSN3
0787  REF   1                 24,3421  0 3457 1            TC      POSN4
0788  REF   1                 24,3422  0 3467 1            TC      POSN5
0789  REF   1                 24,3423  0 3477 0            TC      POSN6
0790  REF   1                 24,3424  0 3507 0            TC      POSN7
0791  REF   1                 24,3425  0 3522 1            TC      POSN8
0792  REF   1                 24,3426  0 3551 0            TC      POSN9
0793  REF   1                 24,3427  0 3562 0            TC      POSN10
0794  REF   1                 24,3430  0 3573 0            TC      POSN11      COMPASS POSITION
```

L IMU PERFORMANCE TESTS 2 USER'S OWN PAGE NO. 20 S3 E5

```
R0795  (XXX.XX MERU) AND A VERTICAL TEST BY DV (XXX.XX MERU) EACH POSITION TELL
R0796  HOW THE DISPLAYS ARE RELATED TO TTHE DRIFT COEFFICIENTS BEING MEASURED.
R0797  NOTE THAT IT IS ILLEGAL TO RUN VERTICAL IN POS 6,4, OR 2 WITHOUT FIRST
R0798  RUNNING HORIZONTAL OF POS 5,3, OR1. THIS IS BECAUSE THE HORIZ DRIFT CALC
R0799  IN 1,3, OR 5 IS USED AS EAST DRIFFFT FOR VERTICAL TEST. THIS IS DONE BY
R0800  THE MACHINE AUTOMATICALLY EXCEPT FOR VERTICAL POSITION 6 WHICH THE
R0801  OPERATOR MUST DO. (SEE POSITION 6 BELOW)
 0802  REF   5 LAST 387   24,3431  3 7746 0  POSN1   CA   HALF      X UP, Y SOUTH, Z EAST
 0803  REF  44 LAST 427   24,3432  55'400 0          TS   XSM
 0804  REF  14 LAST 426   24,3433  55'410 1          TS   YSM +2    NBDY = DH
 0805  REF  12 LAST 414   24,3434  55'420 1          TS   ZSM +4
 0806  REF 141 LAST 427   24,3435  3 7767 0  NGUBGH   CA   ZERO
 0807  REF  13 LAST 424   24,3436  55'541 1          TS   PIPINDEX
 0808  REF  35 LAST 429   24,3437  0 1546 1          TC   QPLACE


 0817  REF   6 LAST 430   24,3440  4 7746 1  POSN2   CS   HALF      X DOWN, Y WEST, Z NORTH
 0818  REF  45 LAST 430   24,3441  55'400 0          TS   XSM
 0819  REF  15 LAST 430   24,3442  55'412 0          TS   YSM +4    NBDZ=DH,NBDX=ADIAX=-DV
 0820  REF  13 LAST 430   24,3443  55'416 1          TS   ZSM +2
 0821  REF   1            24,3444  0 3435 0          TC   NGUBGH


 0832  REF   7 LAST 430   24,3445  3 7746 0  POSN3   CA   HALF      Z UP, Y WEST ,X NORTH
 0833  REF  14 LAST 430   24,3446  55'414 0          TS   ZSM
 0834                     24,3447  4 0000 0          COM            NBDX = -DH
 0835  REF  46 LAST 430   24,3450  55'402 1          TS   XSM +2
 0836  REF  16 LAST 430   24,3451  55'412 0          TS   YSM +4
 0837  REF  59 LAST 425   24,3452  3 7762 0  NSFLAGO  CA   TWO
 0838  REF  14 LAST 430   24,3453  55'541 1          TS   PIPINDEX
 0839  REF 142 LAST 430   24,3454  3 7767 0  NSBUGD   CA   ZERO
 0840  REF   3 LAST 413   24,3455  55'576 0          TS   DRIFTT
 0841  REF  36 LAST 430   24,3456  0 1546 1          TC   QPLACE


 0845  REF   8 LAST 430   24,3457  3 7746 0  POSN4   CA   HALF      Z DOWN, Y SOUTH ,X EAST
 0846  REF  47 LAST 430   24,3460  55'404 1          TS   XSM +4
 0847  REF  17 LAST 430   24,3461  55'410 1          TS   YSM +2
 0848                     24,3462  4 0000 0          COM            NBDY+SRAY=DH,NBDZ+ADIAZ=DV
 0849  REF  15 LAST 430   24,3463  55'414 0          TS   ZSM
 0850  REF  50 LAST 430   24,3464  3 7762 0          CA   TWO
 0851  REF  15 LAST 430   24,3465  55'541 1          TS   PIPINDEX
 0852  REF  37 LAST 430   24,3466  0 1546 1          TC   QPLACE


 0855  REF   9 LAST 430   24,3467  3 7746 0  POSN5   CA   HALF      Y UP, Z NORTH, X WEST
```

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```
0856   REF  18 LAST 430    24,3470  55'406 0          TS     YSM
0857                       24,3471  4 0000 0          COM                NBDZ-SRAZ=DH
0858   REF  48 LAST 430    24,3472  55'404 1          TS     XSM +4
0859   REF  16 LAST 430    24,3473  55'416 1          TS     ZSM +2
0860   REF 116 LAST 420    24,3474  3 7763 1          CA     ONE
0861   REF  16 LAST 430    24,3475  55'541 1          TS     PIPINDEX
0862   REF   1             24,3476  0 3454 1          TC     NSBJGD


R0866  TO RJN POSITION 6 VERTICAL AFTER PIP TEST POS 6 IS DISPLAYED THE OPERATR
R0867  MUST CALCULATE FROM POSN 2,5 -NBDZ-ADSRAZ (XXX.XX)MERU. WHEN P
R0868  IP DATA FLASHES DO VERB 33 ENTER. THIS STARTS VERTICAL TEST. THEN THE
R0869  DATA XXX.XX MERU AS CALCULATED MUST BE ENTERED INTO DRIFTT. TE VERB 21
R0870  ENTER NOUN 01 ENTER LOCATION OF DRIFTT ENTER + (OR -) XXXXX ENTER
0871   REF  10 LAST 430    24,3477  3 7746 0  POSN6   CA     HALF       Y DOWN, Z EAST, X SOUTH
0872   REF  49 LAST 431    24,3500  55'402 1          TS     XSM +2
0873   REF  17 LAST 431    24,3501  55'420 1          TS     ZSM +4
0874                       24,3502  4 0000 0          COM                NBDX +ADSRAX = DH, NBDY -ADIAY = -DV
0875   REF  19 LAST 431    24,3503  55'406 0          TS     YSM
0876   REF 117 LAST 431    24,3504  3 7763 1          CA     ONE
0877   REF  17 LAST 431    24,3505  55'541 1          TS     PIPINDEX
0878   REF  38 LAST 430    24,3506  0 1546 1          TC     QPLACE


0883   REF  11 LAST 431    24,3507  4 7746 1  POSN7   CS     HALF       Z UP-EAST,Y UP-WEST,X NORTH.THIS POSITON
0884   REF  50 LAST 431    24,3510  55'402 1          TS     XSM +2
0885   REF   1             24,3511  3 3663 1          CA     ROOT1/2
0886   REF  20 LAST 431    24,3512  55'406 0          TS     YSM        NBDX - .707 ADSRAX = -DH
0887   REF  18 LAST 431    24,3513  55'414 0          TS     ZSM
0888   REF  19 LAST 431    24,3514  55'420 1          TS     ZSM +4
0889                       24,3515  4 0000 0          COM
0890   REF  21 LAST 431    24,3516  55'412 0          TS     YSM +4
0891   REF   6 LAST 425    24,3517  0 6067 0  GEORGES  TC     FLAGIDWN   UNSET GIMBAL LOCK FLAG
0892                       24,3520   00200 0          OCT    200
0893   REF   2 LAST 431    24,3521  0 3454 1          TC     NSBJGD


0907   REF  12 LAST 431    24,3522  3 7746 0  POSN8   CA     HALF       Z UP-SOUTH,Y UP-NORTH,X EAST.THIS POSITN
0908   REF  51 LAST 431    24,3523  55'404 1          TS     XSM +4
0909   REF   2 LAST 431    24,3524  3 3663 1          CA     ROOT1/2    .707(-NBDZ-NBDY) +.5(ADIAZ-ADIAY)
0910   REF  22 LAST 431    24,3525  55'406 0          TS     YSM        +.5(ADSRAY +ADSRAZ)=DH
0911   REF  20 LAST 431    24,3526  55'416 1          TS     ZSM +2
0912   REF  21 LAST 431    24,3527  55'414 0          TS     ZSM
0913                       24,3530  4 0000 0          COM
0914   REF  23 LAST 431    24,3531  55'410 1          TS     YSM +2
0915   REF   3 LAST 431    24,3532  0 3454 1          TC     NSBJGD
```

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```
0922  REF   1              24,3533  3 3664 0  OPCHKPOS CA    ROOT1SQ     OG=+45DEG,IG=-45DEG,MG=+45DEG.
0923  REF  52 LAST 431     24,3534  55'400 0           TS    XSM
0924  REF  24 LAST 431     24,3535  55'410 1           TS    YSM +2
0925  REF  25 LAST 432     24,3536  55'412 0           TS    YSM +4
0926  REF  22 LAST 431     24,3537  55'414 0           TS    ZSM
0927  REF   3 LAST 431     24,3540  3 3663 1           CA    ROOT1/2
0928  REF  26 LAST 432     24,3541  55'406 0           TS    YSM
0929  REF   1              24,3542  3 3666 1           CA    ROOT3SQ
0930  REF  53 LAST 432     24,3543  55'402 1           TS    XSM +2
0931  REF  23 LAST 432     24,3544  55'420 1           TS    ZSM +4
0932  REF   1              24,3545  4 3665 0           CS    ROOT2SQ
0933  REF  54 LAST 432     24,3546  55'404 1           TS    XSM +4
0934  REF  24 LAST 432     24,3547  55'416 1           TS    ZSM +2
0935  REF  39 LAST 431     24,3550  0 1546 1           TC    QPLACE

0936  REF  13 LAST 431     24,3551  3 7746 0  POSN9    CA    HALF        X UP EAST,Y UP WEST,Z SOUTH,THIS POSITON
0937  REF  25 LAST 432     24,3552  55'416 1           TS    ZSM +2
0938  REF   4 LAST 432     24,3553  3 3663 1           CA    ROOT1/2      -NBDZ +.707 SRAZ =DH
0939  REF  55 LAST 432     24,3554  55'400 0           TS    XSM
0940  REF  56 LAST 432     24,3555  55'404 1           TS    XSM +4
0941  REF  27 LAST 432     24,3556  55'406 0           TS    YSM
0942                       24,3557  4 0000 0           COM
0943  REF  28 LAST 432     24,3560  55'412 0           TS    YSM +4
0944  REF   4 LAST 431     24,3561  0 3454 1           TC    NSBJGD

0955  REF  14 LAST 432     24,3562  3 7746 0  POSN10   CA    HALF        X UP NORTH,Y UP SOUTH,Z EAST,THIS POSITN
0956  REF  26 LAST 432     24,3563  55'420 1           TS    ZSM +4
0957  REF   5 LAST 432     24,3564  3 3663 1           CA    ROOT1/2       .707(NBDY -NBDX) +.5(ADIAY -ADIAX)
0958  REF  57 LAST 432     24,3565  55'400 0           TS    XSM          +.5(ADSRAX) = DH
0959  REF  29 LAST 432     24,3566  55'406 0           TS    YSM
0960  REF  30 LAST 432     24,3567  55'410 1           TS    YSM +2
0961                       24,3570  4 0000 0           COM
0962  REF  58 LAST 432     24,3571  55'402 1           TS    XSM +2
0963  REF   5 LAST 432     24,3572  0 3454 1           TC    NSBJGD

0964  REF  92 LAST 426     24,3573  0 5206 0  POSN11   TC    BANKCALL    COMPASS POSITION
0965  REF   1              24,3574   73044 0           CADR  LOADXSM
0966  REF  40 LAST 432     24,3575  0 1546 1           TC    QPLACE

0970  REF  24 LAST 428     24,3576  3 0342 1  SHOWLD   CA    DSPTEM2
0971  REF   8 LAST 428     24,3577  55'527 1           TS    LENGTHOT
0972  REF  25 LAST 432     24,3600  3 0343 0           CA    DSPTEM2 +1
0973  REF   4 LAST 429     24,3601  55'536 1           TS    NBPOS
0974  REF  26 LAST 432     24,3602  3 0344 1           CA    DSPTEM2 +2
```

L IMU PERFORMANCE TESTS 2 USER'S OWN PAGE NO. 23 S3 E5

```
0975   REF  13 LAST 429    24,3603   55'544 1          TS      POSITON
0976   REF 170 LAST 427    24,3604   0 0002 0          TC      Q

0977                       24,3605   0 0006 1  SHOW    EXTEND
0978   REF  41 LAST 432    24,3606   23'546 1          QXCH    QPLACE
0979   REF  14 LAST 433    24,3607   3 1544 0  SHOW1   CA      POSITON
0980   REF  27 LAST 432    24,3610   54 344 0          TS      DSPTEM2 +2
0981   REF   2 LAST 422    24,3611   3 3643 0          CA      VB06N66
0982   REF  47 LAST 422    24,3612   0 4657 1          TC      NVSBWAIT
0983   REF  12 LAST 422    24,3613   0 4622 0          TC      FLASHON
0984   REF  35 LAST 422    24,3614   0 4475 0          TC      ENDIDLE
0985   REF   1             24,3615   0 2241 1          TC      FINISH
0986   REF  42 LAST 433    24,3616   0 1546 1          TC      QPLACE
0987   REF   2 LAST 411    24,3617   0 3576 0          TC      SHOWLD
0988   REF   1             24,3620   1 3607 1          TCF     SHOW1


098801                     24,3621   0 0006 1  LOADGTSM EXTEND                THIS LOADS XSM INTO GEOMATRX
098802 REF  43 LAST 433    24,3622   23'546 1          QXCH    QPLACE
098803 REF  42 LAST 429    24,3623   0 6112 0          TC      INTPRET
098804                     24,3624    77775 1          VLOAD
098805 REF  59 LAST 432    24,3625    02401 0                  XSM
098806 REF   1             24,3626    26750 1          STOVL   GEOMTRX
098807 REF  31 LAST 432    24,3627    02407 0                  YSM
098808 REF   2 LAST 433    24,3630    26756 1          STOVL   GEOMTRX +6
098809 REF  27 LAST 432    24,3631    02415 0                  ZSM
09881  REF   3 LAST 433    24,3632    02764 0          STORE   GEOMTRX +12D
098811                     24,3633    77776 1          EXIT
098812 REF  44 LAST 433    24,3634   0 1546 1          TC      QPLACE
```

L IMJ PERFORMANCE TESTS 2 USER'S OWN PAGE NO. 24 S3 E5

```
0989                                    0014  14C       EQUALS 0014
0990                        24,3635  02130 1  V21N30E   OCT    02130
0991                        24,3636  04000 0  DESANGLE  DEC    2048
0992                        24,3637  04143 0  SFCONST   DEC    .13107
0993                        24,3640  34000 0  SIZCHK    OCT    34000
0994                        24,3641  00264 1  180DEC    DEC    180
0995                        24,3642  07626 1  3990DEC   DEC    3990
0996                        24,3643  00666 1  V306N66   OCT    00666
0997                        24,3644  01130 1  TESTTIME  DEC    600
0998                        24,3645  01620 1  V16N20S   OCT    01620
0999                        24,3646  01640 1  V16N40S   OCT    01640
1000                        24,3647  00021 1  DEC17     DEC    17
1001                        24,3650  06200 0  DEC585    2DEC   3200 B+14
C1001                       24,3651  00000 1
1002                        24,3652  00400 0  DELYOFF   OCT    00400
1003                        24,3653  00024 1  ERUNITS   2DEC   342844 B-28
C1003                       24,3654  35474 0
1004  REF   7 LAST 429      24,3655  01506 0  GENPLAD   GENADR AZIMUTH
1005  REF   1               24,3656  02521 0  GYRODPL   ECADR  GYROD
1006  REF   10 LAST 409     24,3657  02500 0  DSCPL     ECADR  DSC
1007                        24,3660  77760 0  LOWFOUR   OCT    77760
1008                        24,3661  00070 0  DEC56     DEC    56
1009                        24,3662  10000 0  45DEG     OCT    10000
1010                        24,3663  13241 1  ROOT1/2   DEC    .353553
1011                        24,3664  10000 0  ROOT1SQ   DEC    .250000
1012                        24,3665  15520 1  ROOT2SQ   DEC    .426776
1013                        24,3666  02260 1  ROOT3SQ   DEC    .073223
1014  REF   50 LAST 433     24,3667  01400 1  XSMADR    GENADR XSM


1018                        24,3670  00000 1  SCNBAZ    2DEC   0
C1018                       24,3671  00000 1
1019                        24,3672  00000 1            2DEC   0
C1019                       24,3673  00000 1
1020                        24,3674  20000 0  LABNBAZ   2DEC   .5
C1020                       24,3675  00000 1
1021                        24,3676  00000 1            2DEC   0
C1021                       24,3677  00000 1
1022                        24,3700  00000 1            2DEC   0
C1022                       24,3701  00000 1
1023                        24,3702  20000 0  SCNBVER   2DEC   .5
C1023                       24,3703  00000 1
1024                        24,3704  00000 1            2DEC   0
C1024                       24,3705  00000 1
1025                        24,3706  00000 1  LABNBVER   2DEC   0
C1025                       24,3707  00000 1
1026                        24,3710  00000 1            2DEC   0
C1026                       24,3711  00000 1
1027                        24,3712  57777 1            2DEC   -.5
C1027                       24,3713  77777 0
```

L IMJ PERFORMANCE TESTS 2 USER'S OWN PAGE NO. 25 S3 E5

```
 10271                          24,3714   00144 0  1SECX     2DEC    100
 10272                          24,3715   17127 0  GEORGE2   2DEC    .47408845
C10272                          24,3716   16705 1
 10273                          24,3717   07314 0            2DEC    .23125894
C10273                          24,3720   36223 1
 10274                          24,3721   04521 0            2DEC    .14561689
C10274                          24,3722   31140 0
 10275                          24,3723   75755 1  GEORGE2   2DEC    -.06360691
C10275                          24,3724   73521 0
 10276                          24,3725   72476 1            2DEC    -.16806746
C10276                          24,3726   54176 0
 10277                          24,3727   04771 1            2DEC    .15582939
C10277                          24,3730   03365 1
 10278                          24,3731   75644 0  GEORGE3   2DEC    -.06806784
C10278                          24,3732   70661 1
 10279                          24,3733   47762 1            2DEC    -.75079894
C10279                          24,3734   75077 0
 102791                         24,3735   70023 1            2DEC    -.24878704
C102791                         24,3736   73740 0
 1030   REF   6 LAST 389        24,3737   0 5235 0  DOCHECKG  TC      MAKECADR
 1031   REF   4 LAST 390        24,3740   55547 1            TS      QPLACES
 1032   REF   3 LAST 416        24,3741   0 2776 0           TC      CHECKG
 1033   REF   5 LAST 435        24,3742   3 1547 0           CA      QPLACES
 1034   REF  13 LAST 390        24,3743   0 5230 0           TC      BANKJUMP
```

L IMJ PERFORMANCE TESTS 3 USER'S OWN PAGE NO. 1 S3

```
0001                                  23,2520          BANK    23
0002    REF  51 LAST 434                E5             EBANK=  XSM


0500                                  23,2520  0 0006 1 SILVER  EXTEND
0501    REF  45 LAST 433              23,2521  23'546 1         QXCH    QPLACE          SHOULD BE ADDRESS OF STRTWACH

0502    REF   4 LAST 422              23,2522  11'614 1         CCS     CALCDIR         2F COMMAND IS POSITIVE THE MINUS TORQ
0503    REF   6 LAST 190              23,2523  3 7753 1         CAF     BIT9            WINDING IS TO BE ENERGIZED
0504                                  23,2524  0 2526 1         TC      +2
0505    REF   1                       23,2525  0 2530 0         TC      TORK            COMMAND IS NEG SO USE PLUS WINDING
0506                                  23,2526  0 0006 1         EXTEND
0507    REF   3 LAST 421              23,2527  05 014 1         NOR     14C             SELECTS THE MINUS WINDING

0508    REF  20 LAST 421              23,2530  3 7743 0 TORK    CAF     POSMAX
0509    REF   3 LAST 421              23,2531  54 047 0         TS      GYROCTR         16383 PULSES =2.8125 DEG LESS ONE PULSE

0510    REF   2 LAST 410              23,2532  11'616 0         CCS     GYROBETQ        C(K)= 1 FOR X, -0 FOR Y, -1FOR Z.
0511    REF   1                       23,2533  0 2537 1         TC      SELECTX
0512    REF  12 LAST 413              23,2534  0 4736 1         TC      CCSHOLE
0513    REF   1                       23,2535  0 2547 0         TC      SELECTZ
0514    REF   1                       23,2536  0 2543 1         TC      SELECTY
0515    REF   1                       23,2537  3 2553 0 SELECTX CAF     TORKX           BBITS 7AND 10 IN CHANNEL 14 WILL
0516                                  23,2540  0 0006 1         EXTEND                  SELECT X GYRO AND TURN ON BCSW 1/3200
0517    REF   4 LAST 436              23,2541  05 014 1         NOR     14C             SSEC LATER BY CHANNEL OUTPUT DESIGN.....
0518    REF  46 LAST 436              23,2542  0 1546 1         TC      QPLACE

0519    REF   1                       23,2543  3 2554 1 SELECTY CAF     TORKY           BBITS 8 AND 10 TO TORQ Y GYRO
0520                                  23,2544  0 0006 1         EXTEND
0521    REF   5 LAST 436              23,2545  05 014 1         NOR     14C
0522    REF  47 LAST 436              23,2546  0 1546 1         TC      QPLACE

0523    REF   1                       23,2547  3 2555 0 SELECTZ CAF     TORKZ           BBITS 7,8AND 10 TO TORQ Z GYRO
0524                                  23,2550  0 0006 1         EXTEND
0525    REF   6 LAST 436              23,2551  05 014 1         NOR     14C
0526    REF  48 LAST 436              23,2552  0 1546 1         TC      QPLACE
0527                                  23,2553  01100 1 TORKX    OCT     01100
0528                                  23,2554  01200 1 TORKY    OCT     01200
0529                                  23,2555  01300 0 TORKZ    OCT     01300
```

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```
0530  REF 143 LAST 430   23,2556  3 7767 0  SAMODCHK  CAF   ZERO
0531  REF   4 LAST 420   23,2557  55'563 1            TS    TESTNO
0532  REF  10 LAST 402   23,2560  55'550 1            TS    RUN

0533  REF   1            23,2561  0 3151 1            TC    ZEROMODE
0534  REF   1            23,2562  0 3175 1            TC    OPRTRDLY

0535  REF   1            23,2563  0 3255 0            TC    COARZERO

0536  REF   1            23,2564  0 3161 1            TC    ZEROMAIN
0537  REF   2 LAST 437   23,2565  0 3175 1            TC    OPRTRDLY

0538  REF   2 LAST 437   23,2566  0 3151 1            TC    ZEROMODE

0539  REF 144 LAST 437   23,2567  3 7767 0            CAF   ZERO
0540  REF   1            23,2570  0 3103 0            TC    THETADLD

0541  REF   1            23,2571  3 3332 0            CAF   45ANG
0542  REF   2 LAST 437   23,2572  0 3103 0            TC    THETADLD

0543  REF   1            23,2573  0 3271 0            TC    FNZEROFN

0544  REF   1            23,2574  3 3334 0            CAF   90ANG
0545  REF   3 LAST 437   23,2575  0 3103 0            TC    THETADLD

0546  REF   1            23,2576  3 3335 1            CAF   135ANG
0547  REF   4 LAST 437   23,2577  0 3103 0            TC    THETADLD

0548  REF 145 LAST 437   23,2600  3 7767 0            CAF   ZERO
0549  REF   5 LAST 437   23,2601  0 3105 0            TC    THETADLD +2

0550  REF   2 LAST 437   23,2602  0 3271 0            TC    FNZEROFN

0551  REF   1            23,2603  3 3340 0            CAF   180ANG
0552  REF  15 LAST 415   23,2604  54 400 1            TS    THETAD
0553  REF  16 LAST 437   23,2605  54 401 0            TS    THETAD +1
0554  REF   1            23,2606  3 3333 1            CAF   71ANG
0555  REF   6 LAST 437   23,2607  0 3105 0            TC    THETADLD +2

0556  REF   1            23,2610  3 3341 1            CAF   225ANG
0557  REF   7 LAST 437   23,2611  0 3103 0            TC    THETADLD

0558  REF 146 LAST 437   23,2612  3 7767 0            CAF   ZERO
0559  REF   8 LAST 437   23,2613  0 3103 0            TC    THETADLD

0560  REF  51 LAST 430   23,2614  3 7762 0            CAF   TWO
0561  REF  11 LAST 420   23,2615  55'672 1  CHK2      TS    CDUNDX

0562  REF   1            23,2616  3 3342 1            CAF   170ANG
0563  REF  12 LAST 437   23,2617  51'672 0            INDEX CDUNDX
```

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```
0564   REF  17 LAST 437    23,2620  54 400 1          TS      THETAD

0565   REF  93 LAST 432    23,2621  0 5206 0          TC      BANKCALL
0566   REF   5 LAST 425    23,2622   26065 0          CADR    IMUCOARS

0567   REF   1             23,2623  3 3336 1          CAF     10ANG
0568   REF   1             23,2624  0 3024 1          TC      CDURATE

0569   REF   1             23,2625  3 3337 0          CAF     160ANG
0570   REF   2 LAST 438    23,2626  0 3024 1          TC      CDURATE

0571   REF   1             23,2627  0 3047 1          TC      CALCRATE

0572   REF  94 LAST 438    23,2630  0 5206 0          TC      BANKCALL
0573   REF  24 LAST 426    23,2631   26751 0          CADR    IMUSTALL
0574   REF   1             23,2632  1 2767 1          TCF     ENDTEST03

0575   REF   2 LAST 437    23,2633  0 3255 0          TC      COARZERO

0576   REF  13 LAST 437    23,2634  11'672 1          CCS     CDUXBX
0577   REF   1             23,2635  1 2615 0          TCF     CHK2

0578   REF   2 LAST 437    23,2636  4 3332 1          CS      45ANG
0579   REF   9 LAST 437    23,2637  0 3103 0          TC      THETADLD

0580   REF   3 LAST 437    23,2640  0 3271 0          TC      FNZEROFN

0581   REF   2 LAST 437    23,2641  4 3335 0          CS      135ANG
0582   REF  18 LAST 438    23,2642  54 400 1          TS      THETAD
0583   REF  19 LAST 438    23,2643  54 401 0          TS      THETAD +1
0584   REF   2 LAST 437    23,2644  4 3333 0          CS      71ANG
0585   REF  10 LAST 438    23,2645  0 3105 0          TC      THETADLD +2

05851  REF 147 LAST 437    23,2646  3 7767 0          CAF     ZERO
05852  REF  11 LAST 438    23,2647  0 3105 0          TC      THETADLD +2

0586   REF   4 LAST 438    23,2650  0 3271 0          TC      FNZEROFN

0587   REF   3 LAST 438    23,2651  0 3255 0          TC      COARZERO

0588   REF   1             23,2652  0 3216 1          TC      FINEZERO
0589   REF   2 LAST 438    23,2653  0 3216 1          TC      FINEZERO

0590   REF   1             23,2654  4 3346 1  CHK5    CS      4+6BITS
0591                       23,2655  0 0006 1          EXTEND
0592                       23,2656  03 012 1          MASK    12

0593   REF  13 LAST 418    23,2657  3 7761 0          CAF     FOUR
0594   REF  54 LAST 427    23,2660  0 5663 1          TC      WAITLIST
05945  REF  52 LAST 436              E5               EBANK=  XSM
```

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```
 0595                          23,2661   02665 0          2CADR  ECE1
C0595  REF   1                 23,2662   46065 0
 0596  REF   1                 23,2663   3 3356 1         CAF    ECE2CADR
 0597  REF  12 LAST 427        23,2664   0 5545 0         TC     JOBSLEEP

 0598  REF   2 LAST 439        23,2665   3 3356 1  ECE1   CAF    ECE2CADR
 0599  REF  10 LAST 427        23,2666   0 5551 0         TC     JOBWAKE
 0600  REF  52 LAST 427        23,2667   0 5727 0         TC     TASKOVER

 0601  REF  11 LAST 402        23,2670   4 6306 0  ECE2   CS     SIX
 0602  REF   5 LAST 437        23,2671   6 1563 0         AD     TESTNO
 0603                          23,2672   0 0006 1         EXTEND
 0604                          23,2673   6 2675 1         BZMF   +2
 0605  REF   1                 23,2674   1 2716 1         TCF    CHKX

 0606  REF   6 LAST 439        23,2675   51'563 0         INDEX  TESTNO
 0607  REF   1                 23,2676   3 2771 1         CAF    ERCTRANG
 0608  REF  20 LAST 438        23,2677   54 400 1         TS     THETAD
 0609  REF  21 LAST 439        23,2700   54 401 0         TS     THETAD +1
 0610  REF  22 LAST 439        23,2701   54 402 0         TS     THETAD +2

 0611  REF  30 LAST 423        23,2702   3 7756 1         CAF    BIT6
 0612                          23,2703   0 0006 1         EXTEND
 0613                          23,2704   05 012 1         WOR    12

 0614                          23,2705   0 0004 0         INHINT
 0615  REF  52 LAST 437        23,2706   3 7762 0         CAF    TWO
 0616  REF  55 LAST 438        23,2707   0 5663 1         TC     WAITLIST
06165  REF  53 LAST 438                        E5         EBANK= XSM
 0617                          23,2710    02612 0         2CADR  ATTCV2
C0617  REF   3 LAST 216        23,2711    22065 1
 0618                          23,2712   0 0003 1         RELINT

 0619  REF   3 LAST 437        23,2713   0 3175 1         TC     OPRTRDLY

 0620  REF   7 LAST 439        23,2714   25'563 0         INCR   TESTNO

 0621  REF   1                 23,2715   1 2654 0         TCF    CHK5

 0622  REF   4 LAST 438        23,2716   0 3255 0  CHKX   TC     COARZERO

 0623  REF 148 LAST 438        23,2717   3 7767 0         CAF    ZERO
 0624  REF   8 LAST 439        23,2720   55'563 1         TS     TESTNO

 0625  REF  95 LAST 438        23,2721   0 5206 0         TC     BANKCALL
 0626  REF   4 LAST 417        23,2722    20250 1         CADR   RRZERO
 0627  REF  96 LAST 439        23,2723   0 5206 0         TC     BANKCALL
 0628  REF   7 LAST 417        23,2724    26745 0         CADR   RADSTALL
 0629  REF   2 LAST 438        23,2725   1 2767 1         TCF    ENDTST03
```

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```
0630  REF   9 LAST 439   23,2726  51'563 0  CHK6     INDEX  TESTNO
0631  REF   1            23,2727  3 3000 1           CAF    RADECNTR
0632  REF  22 LAST 417   23,2730  54 423 0           TS     TANG +1
0633  REF  23 LAST 440   23,2731  54 422 1           TS     TANG

0634  REF  37 LAST 439   23,2732  0 5206 0           TC     BANKCALL
0635  REF   3 LAST 417   23,2733   20364 1           CADR   RRDESNB

0637  REF  38 LAST 440   23,2734  0 5206 0           TC     BANKCALL
0638  REF   8 LAST 439   23,2735   26745 0           CADR   RADSTALL
0639  REF   3 LAST 439   23,2736  1 2767 1           TCF    ENDTST03

0640  REF   1            23,2737  0 3170 1           TC     RRDPRDLY

0641  REF  10 LAST 440   23,2740  25'563 0           INCR   TESTNO

0642  REF  14 LAST 438   23,2741  4 7761 1           CS     FOUR
0643  REF  11 LAST 440   23,2742  6 1563 0           AD     TESTNO
0644                     23,2743  0 0006 1           EXTEND
0645  REF   1            23,2744  6 2726 0           BZMF   CHK6

0646  REF 149 LAST 439   23,2745  3 7767 0           CAF    ZERO
0647  REF  12 LAST 440   23,2746  55'563 1           TS     TESTNO
0648  REF   7 LAST 300   23,2747  54 353 0           TS     ALTRATE
0649  REF   7 LAST 300   23,2750  54 351 1           TS     ALT
0650  REF   8 LAST 440   23,2751  54 352 1           TS     ALT +1

0651  REF 118 LAST 431   23,2752  4 7763 0           CS     ONE
0652  REF   6 LAST 221   23,2753  54 350 0           TS     DIDFIG

0653  REF  13 LAST 440   23,2754  51'563 0  CHK7     INDEX  TESTNO
0654  REF   1            23,2755  3 3005 1           CAF    RRRATFPS
0655  REF   4 LAST 296   23,2756  54 357 1           TS     FORVEL
0656  REF   3 LAST 110   23,2757  54 360 0           TS     CATVEL

0657  REF   2 LAST 440   23,2760  0 3170 1           TC     RRDPRDLY

0658  REF  14 LAST 440   23,2761  25'563 0           INCR   TESTNO

0659  REF  19 LAST 426   23,2762  4 7757 1           CS     BIT5
0660  REF  53 LAST 439   23,2763  6 7762 0           AD     TWO
0661  REF  15 LAST 440   23,2764  6 1563 0           AD     TESTNO
0662                     23,2765  0 0006 1           EXTEND
0663  REF   1            23,2766  6 2754 0           BZMF   CHK7

0664  REF  39 LAST 440   23,2767  0 5206 0  ENDTST03 TC     BANKCALL
0665  REF  25 LAST 414   23,2770   30770 1           CADR   ENDTEST
```

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```
0666                23,2771  03013 0  ERCTRANG  OCT   03013
0667                23,2772  02660 0            OCT   02660
0668                23,2773  01042 0            OCT   01042
0669                23,2774  00000 1            OCT   00000
0670                23,2775  76736 1            OCT   76736
0671                23,2776  75120 0            OCT   75120
0672                23,2777  74765 0            OCT   74765



0673                23,3000  01463 1  RADECNTR  OCT   01463
0674                23,3001  01042 0            OCT   01042
0675                23,3002  00000 1            OCT   00000
0676                23,3003  76736 1            OCT   76736
0677                23,3004  76315 1            OCT   76315



0678                23,3005  00000 1  RRRATFPS  OCT   00000
0679                23,3006  00001 0            OCT   00001
0680                23,3007  00002 0            OCT   00002
0681                23,3010  00004 0            OCT   00004
0682                23,3011  00010 0            OCT   00010
0683                23,3012  00020 0            OCT   00020
0684                23,3013  00040 0            OCT   00040
0685                23,3014  00100 0            OCT   00100
0686                23,3015  00200 0            OCT   00200
0687                23,3016  00237 1            OCT   00237
0688                23,3017  00400 0            OCT   00400
0689                23,3020  00545 0            OCT   00545
0690                23,3021  00544 1            OCT   00544
0691                23,3022  77540 0            OCT   77540
0692                23,3023  77232 1            OCT   77232
```

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```
0693                        23,3024  0 0006 1  CDURATE  EXTEND
0694   REF  49 LAST 436     23,3025  23'546 1           DXCH   DPLACE

0695   REF   1              23,3026  55'577 1           TS     CDUCLIMIT

0696   REF   6 LAST 423     23,3027  10 067 1           CCS    NEWJOB
0697   REF   5 LAST 423     23,3030  0 5532 0           TC     CHANG1

0698   REF   2 LAST 442     23,3031  4 1577 1           CS     CDUCLIMIT
0699   REF  14 LAST 438     23,3032  51'672 0           INDEX  CDUNDX
0700   REF  22 LAST 426     23,3033  6 0032 0           AD     CDUX            CATCH FIRST PULSE
0701                        23,3034  0 0006 1           EXTEND
0702   REF   3 LAST 438     23,3035  6 3027 1           BZMF   CDURATE +3      LOOK AGAIN

0703   REF  15 LAST 442     23,3036  51'672 0           INDEX  CDUNDX
0704   REF  23 LAST 442     23,3037  30 032 0           CAE    CDUX
0705   REF   1              23,3040  57'575 1           XCH    CDUREADF        CDU FINAL READING
0706   REF   1              23,3041  57'576 1           XCH    CDUREADI        CDU INITIAL READING

0707   REF   6 LAST 423     23,3042  0 5026 0           TC     FINETIME
0708   REF   1              23,3043  53'573 0           DXCH   CDUTIMEF        DP FINAL TIME
0709   REF   1              23,3044  53'571 1           DXCH   CDUTIMEI        DP INITIAL READING

0710                        23,3045  0 0003 1           RELINT
0711   REF  50 LAST 442     23,3046  0 1546 1           TC     DPLACE




0712                        23,3047  0 0006 1  CALCRATE  EXTEND
0713   REF  51 LAST 442     23,3050  23'546 1           DXCH   DPLACE

0714   REF   2 LAST 442     23,3051  53'576 0           DXCH   CDUREADF
0715                        23,3052  0 0006 1           EXTEND
0716   REF  34 LAST 427     23,3053  20 001 1           MSU    L
0717   REF   1              23,3054  55'677 1           TS     CDUANG

0718   REF  43 LAST 433     23,3055  0 6112 0           TC     INTPRET
0719                        23,3056  45345 1            DLOAD  DSU
0720   REF   2 LAST 442     23,3057  02573 1                   CDUTIMEF
0721   REF   2 LAST 442     23,3060  02571 0                   CDUTIMEI
0722                        23,3061  67206 1            PUSH   SLOAD
0723   REF   2 LAST 442     23,3062  02700 1                   CDUANG
0724                        23,3063  56261 1            SR     DDV
0725                        23,3064  20617 0                   14D
0726                        23,3065  47005 1            DMP    RTB
0727   REF   1              23,3066  07362 1                   DEG/SEC
0728   REF   6 LAST 428     23,3067  33520 0                   SGNAGREE
0729   REF  28 LAST 433     23,3070  00343 0            STORE  DSPTEM2
```

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```
0730                        23,3071   77776 1          EXIT

0731  REF   1               23,3072   3 3353 1  RATEDSP  CAF   V06N46X
0732  REF  48 LAST 433      23,3073   0 4657 1           TC    NVSBWAIT
0733  REF  13 LAST 433      23,3074   0 4622 0           TC    FLASHON
0734  REF  36 LAST 433      23,3075   0 4475 0           TC    ENDIDLE
0735  REF   4 LAST 440      23,3076   1 2767 1           TCF   ENDTST03
0736                        23,3077   1 3101 0           TCF   +2
0737  REF   1               23,3100   1 3072 0           TCF   RATEDSP

0738  REF  11 LAST 437      23,3101   25'550 0           INCR  RUN
0739  REF  52 LAST 442      23,3102   0 1546 1           TC    QPLACE
```

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```
0740  REF  23 LAST 439   23,3103  54 400 1  THETADLD TS     THETAD
0741  REF  24 LAST 444   23,3104  54 401 0            TS     THETAD +1
0742  REF  25 LAST 444   23,3105  54 402 0            TS     THETAD +2

0743                     23,3106  0 0006 1            EXTEND
0744  REF  53 LAST 443   23,3107  23'546 1            DXCH   DPLACE

0745  REF   9 LAST 370   23,3110  3 7765 1            CAF    SEVEN
0746  REF  12 LAST 425   23,3111  55'551 0  THLD1      TS     STOREPL

0747  REF 100 LAST 440   23,3112  0 5206 0            TC     BANKCALL
0748  REF   6 LAST 438   23,3113   26065 0            CADR   IMUCOARS
0749  REF 101 LAST 444   23,3114  0 5206 0            TC     BANKCALL
0750  REF  25 LAST 438   23,3115   26751 0            CADR   IMUSTALL
0751  REF   5 LAST 443   23,3116  1 2767 1            TCF    ENDTST03

0752  REF  13 LAST 444   23,3117  11'551 0            CCS    STOREPL
0753  REF   1            23,3120  0 3111 0            TC     THLD1

0754  REF   4 LAST 439   23,3121  0 3175 1            TC     DPRTBDLY

0755  REF  54 LAST 444   23,3122  0 1546 1            TC     DPLACE



0756                     23,3123  0 0006 1  FINEALGN  EXTEND
0757  REF  55 LAST 444   23,3124  23'546 1            DXCH   DPLACE

0758  REF 102 LAST 444   23,3125  0 5206 0            TC     BANKCALL
0759  REF   5 LAST 426   23,3126   26252 0            CADR   IMUFINE
0760  REF 103 LAST 444   23,3127  0 5206 0            TC     BANKCALL
0761  REF  26 LAST 444   23,3130   26751 0            CADR   IMUSTALL
0762  REF   6 LAST 444   23,3131  1 2767 1            TCF    ENDTST03

0763  REF  56 LAST 444   23,3132  0 1546 1            TC     DPLACE
```

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```
0764                        23,3133  0 0006 1  CH30DSPY EXTEND
0765  REF  57 LAST 444      23,3134  23'546 1           QXCH   QPLACE

0766  REF   1               23,3135  3 3344 1           CAF    OCT30
0767  REF 235 LAST 425      23,3136  54 146 0           TS     MPAC +2
0768  REF   1               23,3137  3 3347 1           CAF    V01N10X
0769  REF  49 LAST 443      23,3140  0 4657 1           TC     NVSBWAIT
0770  REF  14 LAST 443      23,3141  0 4622 0           TC     FLASHON
0771  REF  37 LAST 443      23,3142  0 4475 0           TC     ENDIDLE
0772  REF   7 LAST 444      23,3143  1 2767 1           TCF    ENDTST03
0773                        23,3144  1 3146 0           TCF    +2
0774  REF   1               23,3145  1 3135 1           TCF    CH30DSPY +2

0775  REF   4 LAST 284      23,3146  0 4626 1           TC     FLASHOFF
0776  REF  12 LAST 443      23,3147  25'550 0           INCR   RUN
0777  REF  58 LAST 445      23,3150  0 1546 1           TC     QPLACE




0778                        23,3151  0 0006 1  ZEROMODE EXTEND
0779  REF  59 LAST 445      23,3152  23'546 1           QXCH   QPLACE

0780  REF 104 LAST 444      23,3153  0 5206 0           TC     BANKCALL
0781  REF   9 LAST 426      23,3154  26000 0            CADR   IMUZERO
0782  REF 105 LAST 445      23,3155  0 5206 0           TC     BANKCALL
0783  REF  27 LAST 444      23,3156  26751 0            CADR   IMUSTALL
0784  REF   8 LAST 445      23,3157  1 2767 1           TCF    ENDTST03

0785  REF  60 LAST 445      23,3160  0 1546 1           TC     QPLACE




0786  REF   2 LAST 438      23,3161  4 3346 1  ZEROMAIN CS     4+6BITS
0787                        23,3162  0 0006 1           EXTEND
0788                        23,3163  03 012 1           WAND   12

0789  REF  20 LAST 440      23,3164  3 7757 0           CAF    BIT5
0790                        23,3165  0 0006 1           EXTEND
0791                        23,3166  05 012 1           WOR    12

0792  REF 171 LAST 433      23,3167  0 0002 0           TC     Q
```

```
0793                        23,3170  0 0006 1  RRDPRDLY EXTEND
0794  REF   9 LAST 427     23,3171  23'545 1            DXCH   DPLAC

0795  REF  13 LAST 445     23,3172  25'550 0            INCR   RUN

0796  REF   1              23,3173  3 3352 0            CAF    V06N40X
0797  REF   5 LAST 444     23,3174  1 3201 0            TCF    DPRTRDLY +4



0798                        23,3175  0 0006 1  DPRTRDLY EXTEND
0799  REF  10 LAST 446     23,3176  23'545 1            DXCH   DPLAC

0800  REF  14 LAST 446     23,3177  25'550 0            INCR   RUN
0801  REF   1              23,3200  3 3351 0            CAF    V06N50X
0802  REF  50 LAST 445     23,3201  0 4657 1            TC     NVSBWAIT
0803  REF   1              23,3202  3 3354 0            CAF    V33N00X
0804  REF  51 LAST 446     23,3203  0 4657 1            TC     NVSBWAIT
0805  REF  15 LAST 446     23,3204  3 1550 0            CA     RUN
0806  REF   1              23,3205  7 3343 1            MASK   BLOW
0807  REF  52 LAST 446     23,3206  0 4657 1            TC     NVSBWAIT
0808  REF  15 LAST 445     23,3207  0 4622 0            TC     FLASHON
0809  REF  38 LAST 445     23,3210  0 4475 0            TC     ENDIDLE
0810  REF   9 LAST 445     23,3211  1 2767 1            TCF    ENDTST03
0811                        23,3212  1 3214 1            TCF    +2
0812  REF   6 LAST 446     23,3213  1 3200 1            TCF    DPRTRDLY +3

0813  REF   5 LAST 445     23,3214  0 4626 1            TC     FLASHOFF
0814  REF  11 LAST 446     23,3215  0 1545 1            TC     DPLAC

0815                        23,3216  0 0006 1  FINEZERO EXTEND
0816  REF  12 LAST 446     23,3217  23'545 1            DXCH   DPLAC

0817  REF 106 LAST 445     23,3220  0 5206 0            TC     BANKCALL
0818  REF  10 LAST 445     23,3221  26000 0             CADR   IMUZERO

0819  REF  54 LAST 440     23,3222  3 7762 0            CAF    TWO
0820  REF   6 LAST 399     23,3223  55'512 1            TS     ERODTN
0821  REF  15 LAST 440     23,3224  3 7761 0            CAF    FOUR
0822  REF  15 LAST 433     23,3225  55'544 1            TS     POSITON

0823                        23,3226  0 0004 0            INHINT
0824  REF  34 LAST 420     23,3227  4 7752 1            CS     BIT10
0825  REF  31 LAST 396     23,3230  7 0074 0            MASK   STATE
0826  REF  35 LAST 446     23,3231  6 7752 0            AD     BIT10
0827  REF  32 LAST 446     23,3232  54 074 0            TS     STATE
0828                        23,3233  0 0003 1            RELINT
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```
0829   REF 107 LAST 446    23,3234  0 5206 0          TC     BANKCALL
0830   REF   2 LAST 380    23,3235   31003 0          CADR   LEMLAB

0831   REF  16 LAST 428    23,3236  0 4644 0  SAMODRIN TC     GRABWAIT

0834   REF   2 LAST 437    23,3237  0 3161 1          TC     ZEROMAIN

083405                     23,3240  0 0004 0          INHINT
08341  REF  22 LAST 416    23,3241  3 7751 0          CAF    BIT11
083415 REF  56 LAST 439    23,3242  0 5663 1          TC     WAITLIST
083417 REF  54 LAST 439                E5             EBANK= XSM
08342                      23,3243   03247 0          2CADR  DSPY30
C08342 REF   1             23,3244   46065 0
083425 REF   1             23,3245  3 3355 1          CAF    CH30WAKE
08343  REF  13 LAST 439    23,3246  0 5545 0          TC     JOBSLEEP

083435 REF   2 LAST 447    23,3247  3 3355 1  DSPY30  CAF    CH30WAKE
08344  REF  11 LAST 439    23,3250  0 5551 0          TC     JOBWAKE
083445 REF  53 LAST 439    23,3251  0 5727 0          TC     TASKOVER

0835   REF   2 LAST 445    23,3252  0 3133 0  DSPYCH30 TC     CH30DSPY
0836   REF   3 LAST 437    23,3253  0 3151 1          TC     ZEROMODE

0837   REF  13 LAST 446    23,3254  0 1545 1          TC     QPLAC


0838   REF 150 LAST 440    23,3255  3 7767 0  COARZERO CAF    ZERO
0839   REF  26 LAST 444    23,3256   54 400 1          TS     THETAD
0840   REF  27 LAST 447    23,3257   54 401 0          TS     THETAD +1
0841   REF  28 LAST 447    23,3260   54 402 0          TS     THETAD +2

0842                       23,3261  0 0006 1          EXTEND
0843   REF  51 LAST 445    23,3262  23'546 1          DXCH   QPLACE

0844   REF 108 LAST 447    23,3263  0 5206 0          TC     BANKCALL
0845   REF   7 LAST 444    23,3264   26065 0          CADR   IMJCOARS
0846   REF 109 LAST 447    23,3265  0 5206 0          TC     BANKCALL
0847   REF  28 LAST 445    23,3266   26751 0          CADR   IMJSTALL
0848   REF  10 LAST 446    23,3267  1 2767 1          TCF    ENDTST03

0849   REF  52 LAST 447    23,3270  0 1546 1          TC     QPLACE
```

L IMJ PERFORMANCE TESTS 3 USER'S OWN PAGE NO. 13 S3 E5

```
0850                        23,3271  0 0006 1  FNZEROFN EXTEND
0851   REF  14 LAST 447     23,3272  23'545 1           DXCH   DPLAC

0852   REF   1              23,3273  0 3123 1           TC     FINEALGN

0853   REF  24 LAST 442     23,3274  30 032 0           CAE    CDUX
0854   REF   3 LAST 442     23,3275  55'575 0           TS     CDUREADF
0855   REF  12 LAST 426     23,3276  30 033 1           CAE    CDUY
0856   REF   2 LAST 442     23,3277  55'576 0           TS     CDUREADI
0857   REF  10 LAST 426     23,3300  30 034 0           CAE    CDUZ
0858   REF   3 LAST 442     23,3301  55'577 1           TS     CDULIMIT

0859   REF   4 LAST 447     23,3302  0 3151 1           TC     ZERODMODE

0868   REF   4 LAST 448     23,3303  31'575 1  FZF2     CAE    CDUREADF
0869                        23,3304  0 0006 1           EXTEND
0870   REF  25 LAST 448     23,3305  20 032 1           MSU    CDUX
0871   REF  46 LAST 418     23,3306  54 337 1           TS     DSPTEM1

0872   REF   3 LAST 448     23,3307  31'576 1           CAE    CDUREADI
0873                        23,3310  0 0006 1           EXTEND
0874   REF  13 LAST 448     23,3311  20 033 0           MSU    CDUY
0875   REF  47 LAST 448     23,3312  54 340 1           TS     DSPTEM1 +1

0876   REF   4 LAST 448     23,3313  31'577 0           CAE    CDULIMIT
0877                        23,3314  0 0006 1           EXTEND
0878   REF  11 LAST 448     23,3315  20 034 1           MSU    CDUZ
0879   REF  48 LAST 448     23,3316  54 341 0           TS     DSPTEM1 +2

0880   REF   1              23,3317  3 3350 1  FZFDSP   CAF    V05N30X
0881   REF  53 LAST 446     23,3320  0 4657 1           TC     NVSBWAIT
0882   REF  16 LAST 446     23,3321  0 4622 0           TC     FLASHON
0883   REF  39 LAST 446     23,3322  0 4475 0           TC     ENDIDLE
0884   REF  11 LAST 447     23,3323  1 2767 1           TCF    ENDTEST03
0885                        23,3324  1 3326 1           TCF    +2
0886   REF   1              23,3325  1 3317 0           TCF    FZFDSP

0887   REF  16 LAST 446     23,3326  25'550 0           INCR   RUN
0888   REF  15 LAST 448     23,3327  0 1545 1           TC     DPLAC
```

L IMJ PERFORMANCE TESTS 3 USER'S OWN PAGE NO. 14 S3 E5

```
 0889                    23,3330  00133 0  14NG      OCT   00133
 0890                    23,3331  06000 1  33.75ANG  OCT   06000
 0891                    23,3332  10000 0  45ANG     OCT   10000
 0892                    23,3333  14477 0  71ANG     OCT   14477
 0893                    23,3334  20000 0  90ANG     OCT   20000
 0894                    23,3335  30000 1  135ANG    OCT   30000
 0895                    23,3336  01616 1  10ANG     OCT   01616
 0896                    23,3337  34344 0  150ANG    OCT   34344
 0897                    23,3340  40000 0  180ANG    OCT   40000
 0898                    23,3341  50000 1  225ANG    OCT   50000
 0899                    23,3342  36162 1  170ANG    OCT   36162

 0900                    23,3343  00077 1  6LOW      OCT   77
 0901                    23,3344  00030 1  OCT30     OCT   30
 0902                    23,3345  00454 1  35EC      DEC   300
 0903                    23,3346  00050 1  4+6BITS   OCT   00050

 0904                    23,3347  00110 1  V01N10X   OCT   00110
 0905                    23,3350  00530 1  V05N30X   OCT   00530
 0906                    23,3351  00620 0  V06N20X   OCT   00620
 0907                    23,3352  00640 0  V06N40X   OCT   00640
 0908                    23,3353  00666 1  V06N66X   OCT   00666
 0909                    23,3354  03300 1  V33N00X   OCT   03300

 09095 REF   1           23,3355  47252 1  C430WAKE  CADR  DSPYCH30
 0910  REF   1           23,3356  46670 1  ECE2CADR  CADR  ECE2
 0911  REF   1           23,3357  47303 1  FZF2CADR  CADR  FZF2
 0912  REF  11 LAST 434  23,3360  02500 0  OGCECADR  ECADR OGC

 0913                    23,3361  00043 0  DEG/SEC   2DEC  5760000 B-28
C0913                    23,3362  05000 1
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 1 S3

```
R000001 PROGRAM NAME-OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION
R000002 DATE- NOVEMBER 2  1966
R000003 BY- GEORGE SCHMIDT ILI 7-146 EXT. 126
R000004 MOD NO 2
R000006 FUNCTIONAL DESCRIPTION

R000008 THIS LOG SECTION CONSISTS OF PRELAUNCH ALIGNMENT AND GYRO DRIFT TESTS
R000009 INTEGRATED TOGETHER TO SAVE WORDS. IT IS COMPLETELY RESTART PROOFED.
R00001  THE PRELAUNCH ALIGNMENT TECHNIQUE IS BASICALLY THE SAME AS IN BLOCK 1
R000011 EXCEPT THAT IT HAS BEEN SIMPLIFIED IN THE SENSE THAT SMALL ANGLE APPROX.
R000012 HAVE BEEN USED. THE DRIFT TESTS USE A UNIQUE IMPLEMENTATION OF THE
R000013 OPTIMUM STATISTICAL FILTER. FOR A DESCRIPTION SEE E-1973.BOTH OF THESE
R000014 ROUTINES USE STANDARD SYSTEM TEST LEADIN PROCEDURES. THE INITIALIZATION
R000015 PROCEDURE FOR THE DRIFT TESTS IS IN THE JOC S. THE INITIALIZATION METHOD
R000016 FOR GYROCOMPASS IS IN A STG MEMO FOR EACH ASSEMBLY.
R000017 THIS LOG SECTION ALWAYS STARTS BY A CADR IN IMU PERF. TESTS 2 AND BEGINS
R000018 AT ESTIMS. THE PIPS ARE READ EVERY .5 SEC IN COMPASS AND 1 SEC IN DRIFT
R000019 TESTS. THEN IN BOTH CASES RELEVANT COMPUTATION IS DONE. THE KEY ERASABLE
R00002  IS GEOCOMPS- 0 WE ARE IN A DRIFT TEST -NONZERO WE ARE IN COMPASS.
R000021 THE GYROCOMPASS HAS THE CAPABILITY TO ALIGN TO ANY ORIENTATION.HAS THE
R000022 CAPABILITY TO BE COMPENSATED FOR
R000023 COMPONENT ERRORS,IS CAPABLE OF OPTICAL VERIFICATION( CSM ONLY).

R000025 SUBROUTINES CALLED

R000027 EARTHR, CALGTA,  OGC ZERO,ERTHRVSE,GCOMPZERO AND
R000028 IMU COMPENSATION
R000029 DURING OPTICAL VERIFICATION (CSM ONLY) ESSENTIALLY ALL OF INFLIGHT ALIGN
R00003  IS CALLED IN ONE WAY OR ANOTHER. SEE THE LISTING.

R000032 NORMAL EXIT

R000034 DRIFT TESTS- LENGTHOT GOES TO ZERO-RETURN TO IMU PERF TEST2 CONTROL
R000035 GYROCOMPASS-GRR RECEIVED OR G LEVEL EXCEEDS GLIFTOFF-START UP MP 2
R000036                                                    206 IMPLEMENTATION

R000038 ALARMS

R00004  1600    OVERFLOW IN DRIFT TEST
R000041 1601    BAD IMU TORQUE ABORT
R000042 1602    BAD OPTICS DURING VERIFICATION-RETURN TO COMPASS      CSM ONLY

R000044 OUTPUT

R000046 DRIFT TESTS- FLASHING DISPLAYS OF RESULTS-CONTROLLED IN IMU PERF TESTS 2
R000047 COMPASS-PROGRAM MODE LIGHTS TELL YOU WHAT PHASE OF PROGRAM YOU ARE IN
R000048    01   INITIALIZING THE PLATFORM POSITION AND ERASABLE
R00007     02   GYROCOMPASSING
R000071    03   DOING OPTICAL VERIFICATION (CSM)
R000072    04   GRR SIGNAL RECEIVED FINISH UP TORQUE AND TC MP2JOB
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 2 S3

R000073 206 IMPLEMENTATION

R000075 DEBRIS

R000077 ALL CENTRALS,ALL OF EBANK XSM,AND 78 DEC LOCATIONS (SEE STOREDTA..

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 3 53

```
0001                                    35,2014          BANK   35
0003   REF  55 LAST 447                    E5           EBANK= XSM


R0004  G SCHMIDT SIMPLIFIED ESTIMATION PROGRAM FOR ALIGNMENT CALIBRATION. THE
R0005  PROGRAM IS COMPLETELY RESTART PROFED. DATA STORED IN BANK4.
0010   REF  12 LAST 414   35,2014  0 4161 0  ESTIMS   TC     PHASCHNG
0011                      35,2015   00075 0             OCT    00075
00115  REF  31 LAST 404   35,2016  3 7763 1             CAF    BIT1
00116  REF   1            35,2017  0 4105 1             TC     SETRSTRT      SET RESTART FLAG

0012                      35,2020  0 0004 0  RSTGTS1   INHINT                COMES HERE PHASE1 RESTART
0015   REF   9 LAST 224   35,2021  3 0025 0             CA     TIME1
0016   REF   1            35,2022  55'745 1             TS     GTSWTLST
0017   REF 151 LAST 447   35,2023  4 7767 1             CS     ZERO
0018   REF  15 LAST 424   35,2024  54 037 1             TS     PIPAX
0019   REF   5 LAST 416   35,2025  54 040 1             TS     PIPAY
0020   REF   6 LAST 416   35,2026  54 041 0             TS     PIPAZ
00201  REF   9 LAST 337   35,2027  54 404 0             TS     DELVX +1
00202  REF   2 LAST 337   35,2030  54 406 1             TS     DELVY +1
00203  REF   2 LAST 337   35,2031  54 410 0             TS     DELVZ +1
0021                      35,2032  0 0003 1             RELINT
0022   REF   1            35,2033  0 2773 0             TC     SETJPER
0023   REF   1            35,2034  3 3315 0             CA     77DECML
0024   REF   6 LAST 429   35,2035  55'777 0             TS     ZERONDX
0025   REF   1            35,2036  3 3316 0             CA     ALXXXZ
0026   REF 110 LAST 447   35,2037  0 5206 0             TC     BANKCALL
0027   REF   4 LAST 429   35,2040   51245 0             CADR   ZEROING
0028   REF  44 LAST 442   35,2041  0 6112 0             TC     INTPRET
0029                      35,2042   77775 1             VLOAD
0030   REF   1            35,2043   33310 0                    INTVAL +2
0031   REF   1            35,2044   02601 1             STORE  ALX1S
0032                      35,2045   77776 1             EXIT

0033   REF   4 LAST 412   35,2046  11'742 0             CCS    GEOCOMPS      GEOCOMPS IN NON ZERO IF COMPASS
0034                      35,2047  0 2051 1             TC     +2
0035   REF   1            35,2050  0 2720 0             TC     SLEEPIE +1
0036   REF   9 LAST 432   35,2051  3 1527 0             CA     LENGTHOT        TIMES FIVE IS THE NUM OF SEC ERECTING
0037   REF   1            35,2052  55'746 1             TS     ERECTIME

003701 REF 119 LAST 440   35,2053  3 7763 1             CA     ONE
003702 REF   3 LAST 335   35,2054  54 764 0             TS     PHASENUM
0038   REF   9 LAST 396   35,2055  0 4117 1             TC     NEWMODEX
0039                      35,2056   00002 0             OCT    02
00391  REF 111 LAST 452   35,2057  0 5206 0             TC     BANKCALL
003911 REF   1            35,2060   25606 0             CADR   GCOMPZER      ZERO COMPENSATION PROGRAM REGISTERS
0040   REF   1            35,2061  0 2770 0             TC     ANNNNNN
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 4 S3 E5

```
 0087   REF  10 LAST 452    35,2062  3 0025 0  ALLOOP    CA     TIME1
 0088   REF   2 LAST 452    35,2063  57'745 0           XCH    GTSWTLST      STORE TIME TO SET UP NEXT WAITLIST.
 00885  REF   1             35,2064  55'743 1           TS     OLDGT         SAVE LAST READ TIME.

 0089   REF   1             35,2065  3 1664 1  ALLOOP3  CA     ALTIM
 0090   REF   1             35,2066  55'716 1           TS     GEOSAVED
 0091   REF  13 LAST 452    35,2067  0 4161 0           TC     PHASCHNG
 0092                       35,2070   00115 1           OCT    00115
 0095   REF   2 LAST 453    35,2071  3 1716 0  ALLOOP1  CA     GEOSAVED
 0096   REF   2 LAST 453    35,2072  55'664 0           TS     ALTIM
 0097   REF 222 LAST 425    35,2073  10 000 0           CCS    A
 0098   REF 223 LAST 453    35,2074  3 0000 1           CA     A             SHOULD NEVER HIT THIS LOCATION
 0099   REF   1             35,2075  55'665 1           TS     ALTIMS
 0100   REF 224 LAST 453    35,2076  4 0000 0           CS     A
 0101   REF   3 LAST 453    35,2077  55'664 0           TS     ALTIM
 01011  REF  16 LAST 452    35,2100  3 0037 0           CA     PIPAX
 01012  REF  10 LAST 452    35,2101  54 403 1           TS     DELVX
 01013  REF   6 LAST 452    35,2102  3 0040 0           CA     PIPAY
 01014  REF   3 LAST 452    35,2103  54 405 1           TS     DELVY
 01015  REF   7 LAST 452    35,2104  3 0041 1           CA     PIPAZ
 010151 REF   3 LAST 452    35,2105  54 407 0           TS     DELVZ
 010152 REF   1             35,2106  3 3334 0           CA     SCHOCT23
 010153 REF   3 LAST 327    35,2107  0 4246 0           TC     NEWPHASE
 010154                     35,2110   00005 1           OCT    00005
 010161 REF 152 LAST 452    35,2111  4 7767 1  SPECSTS  CS     ZERO
 010162 REF  17 LAST 453    35,2112  54 037 1           TS     PIPAX
 010163 REF   7 LAST 453    35,2113  54 040 1           TS     PIPAY
 010164 REF   8 LAST 453    35,2114  54 041 0           TS     PIPAZ
 0113   REF   5 LAST 324    35,2115  3 7746 0           CAF    PRIO20
 0116   REF  11 LAST 381    35,2116  0 5516 0           TC     FINDVAC
 01165  REF  56 LAST 452                 E5            EBANK= XSM
 0117                       35,2117   02122 1           2CADR  ALFLT         START THE JOB
C0117   REF   1             35,2120   72065 1
 0118   REF  54 LAST 447    35,2121  0 5727 0           TC     TASKOVER
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 5 S3 E5

```
0119   REF   1              35,2122   0 3004 0   ALFLT    TC      STORFDTA      STORE DATA IN CASE OF RESTART IN JOB
0120   REF  14 LAST 453     35,2123   0 4161 0            TC      PHASCHNG      THIS IS THE JOB DONE EVERY ITERATION
0121                        35,2124     00215 1           OCT     00215
012101                      35,2125   1 2127 0            TCF     +2
012102 REF   1              35,2126   0 3025 0   ALFLT1   TC      LOADSTDT      COMES HERE ON RESTART
01211  REF   5 LAST 452     35,2127   11742 0            CCS     GEOCOMPS
01212                       35,2130   0 2132 0            TC      +2
01213  REF   1              35,2131   0 2156 1            TC      NORMLOP
012131 REF   1              35,2132   0 3371 1            TC      CHKCOMED      SEE IF PRELAUNCH OVER
01214  REF 112 LAST 452     35,2133   0 5206 0            TC      BANKCALL      COMPENSATION IF IN COMPASS
01215  REF   1              35,2134     25222 1           CADR    1/PIPA
0122   REF   3 LAST 453     35,2135   4 1745 1            CS      GTSWTLST      SEE IF MEASURED DELV LOOKS LIKE LIFTOFF
012205 REF   2 LAST 453     35,2136   6 1743 0            AD      OLDGT         HAS OCCURRED.
01221                       35,2137   0 0006 1           EXTEND
012215                      35,2140   6 2143 0           BZMF    +3
01222  REF   2 LAST  96     35,2141   6 7744 1            AD      NEG1/2        (IF TIME1 OVERFLOWED)
012225 REF   3 LAST 454     35,2142   6 7744 1            AD      NEG1/2
01223  REF 236 LAST 445     35,2143   54 147 1            TS      MPAC +3       DT STORED NEGATIVELY

012235 REF  45 LAST 452     35,2144   0 6112 0            TC      INTPRET

01224                       35,2145     42535 1           SLOAD   SL4           SCALE DT AT 2(+10) CS.
012245 REF 237 LAST 454     35,2146     00150 0                   MPAC +3
01225                       35,2147     51515 1           PDVL    ABVAT
012255 REF   1              35,2150     00404 1                   DELV
01226                       35,2151     77671 1           PDV                   GET ACC (NEG) IN M/SEC SQ SCALED 2(4)
012265                      35,2152     50015 0           PAD     BMN           (DV OVFLO GIVES DP POSMAX)
01227  REF   1              35,2153     01765 1                   GLIFTOFF      WHEN GLIFTOFF = DP POSMAX, THIS KIND OF
012275 REF   1              35,2154     73401 0                   GRRNOW        LIFTOFF DETECTION IS INHIBITED.
01228                       35,2155     77776 1           EXIT                  CONTINUE GYROCOMPASS IF NO LIFTOFF.

0124                        35,2156   0 0006 1   NORMLOP  EXTEND
0125   REF   2 LAST 452     35,2157   3 3306 1            DCA     INTVAL
01251  REF  19 LAST 426     35,2160   50 110 1            INDEX   FIXLOC
0126   REF  15 LAST 427     35,2161   52 051 1            DXCH    S1
0127   REF   6 LAST 454     35,2162   11742 0            CCS     GEOCOMPS
0128   REF   1              35,2163   0 2203 1            TC      PALFLT        COMPASS
0129   REF  46 LAST 454     35,2164   0 6112 0            TC      INTPRET       NO COMPASS
0131                        35,2165     50135 0   ALCGKK   SLOAD   BMN
0132   REF   2 LAST 453     35,2166     02666 0                   ALTIMS
0133   REF   1              35,2167     72204 1                   ALFLT2
0134                        35,2170     72174 0   ALKCG    AXT,2   LXA,1          LOADS SLOPES AND TIME CONSTANTS AT RQST
0135                        35,2171     00014 1                   12D
0136   REF   2 LAST 452     35,2172     02600 0                   ALX1S
0137                        35,2173     62143 0   ALKCG2   DLOAD*  INCR,1
0138   REF   1              35,2174     33300 1                   ALFDK +144D,1
0139                        35,2175     77775 1           DEC     -2
0140   REF   1              35,2176     12701 1           STORE   ALDK +10D,2
0141                        35,2177     66104 1           TIX,2   SXA,1
0142   REF   1              35,2200     72173 1                   ALKCG2
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 6 S3 E5

```
0143    REF   3 LAST 454     35,2201   02600 0                    ALX1S

01431                        35,2202   77776 1            EXIT
01432   REF  47 LAST 454     35,2203   0 6112 0  PALFLT   TC     INTPRET
0144                         35,2204   61375 1   ALFLT2   VLOAD  VXM
0145    REF  11 LAST 453     35,2205   00404 1                   DELVV
0146    REF   4 LAST 433     35,2206   02750 1                   GEOMTRX
0147                         35,2207   77772 0            VSL1
0149                         35,2210   57545 1            DLOAD  DCOMB
0150    REF 238 LAST 454     35,2211   00150 0                   MPAC +3
0151    REF   1              35,2212   16657 1            STODL  DPIPAY
0152    REF 239 LAST 455     35,2213   00152 1                   MPAC +5
0153    REF   1              35,2214   02663 0            STORE  DPIPAZ

0154                         35,2215   76001 1            SETPD  AXT,1          MEASUREMENT INCORPORATION ROUTINES.
0155                         35,2216   00001 0                   0
0156                         35,2217   00010 0                   8D
0157                         35,2220   57535 0            SLOAD  DCOMB
0158    REF   7 LAST 454     35,2221   02743 0                   GEOCOMPS
01581                        35,2222   77640 0            BMN
0159    REF   1              35,2223   72532 0                   ALWAYSG       DO A QUICK COMPASS
0160                         35,2224   41343 0   DELMLP   DLOAD* DMP
0161    REF   2 LAST 455     35,2225   02667 1                   DPIPAY +8D,1
0162    REF   1              35,2226   33321 1                   PIPASC
0163                         35,2227   42661 0            SLR    DAD*
0164                         35,2230   21212 0                   9D
0165    REF   1              35,2231   02715 0                   DELM +8D,1
0166                         35,2232   64623 1            DSU*   PDDL*
0167    REF   2 LAST  46     35,2233   02635 0                   INTY +8D,1
0168    REF   2 LAST  46     35,2234   02655 0                   VLAJN +8D,1
0169                         35,2235   41223 1            DSU*   DMP
0170    REF   2 LAST  46     35,2236   02627 0                   VLAJNS +8D,1
0171    REF   1              35,2237   33323 0                   VELSC
0172                         35,2240   77732 1            SL2R
0173                         35,2241   45415 0            DAD    STADR
0174    REF   2 LAST 455     35,2242   71062 0            STORE  DELM +8D,1
0175    REF   3 LAST 455     35,2243   06717 0            STORE  DELM +10D,1
01751                        35,2244   77743 1            DLOAD*
0176    REF   3 LAST 455     35,2245   02655 0                   VLAJN +8D,1
0177    REF   3 LAST 455     35,2246   06627 1            STORE  VLAJNS +8D,1
01771                        35,2247   77745 1            DLOAD
0178    REF   3 LAST 454     35,2250   33304 0                   INTVAL -2
0179    REF   3 LAST 455     35,2251   06635 1            STORE  INTY +8D,1
0180                         35,2252   77100 0            TIX,1  AXT,2
0181    REF   1              35,2253   72224 0                   DELMLP
0182                         35,2254   00004 0                   4
0183                         35,2255   56743 1   ALILP    DLOAD* DMPR*
0184    REF   1              35,2256   75170 0                   ALK +4,2
0185    REF   2 LAST 454     35,2257   75104 0                   ALOK +4,2
0186    REF   2 LAST 455     35,2260   12607 0            STORE  ALK +4,2
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 7 S3 E5

```
0187                        35,2261  77104 1          TIX,2  AXT,2
0188  REF  1                35,2262  72255 0                 ALILP
0189                        35,2263  00010 0                 8D
0190                        35,2264  66140 1  ALKLP   LXC,1  SXA,1
0191  REF  1                35,2265  02601 1                 CMPX1
0192  REF  2 LAST 456       35,2266  02601 1                 CMPX1
0193                        35,2267  56743 1          DLOAD* DMPR*
0194  REF  3 LAST 455       35,2270  02604 1                 ALK +1,1
0195  REF  4 LAST 455       35,2271  75062 1                 DELM +8D,2
0196                        35,2272  77613 0          DAD*
0197  REF  4 LAST 455       35,2273  75142 1                 INTY +8D,2
0198  REF  5 LAST 456       35,2274  12635 1          STORE  INTY +8D,2
01981                       35,2275  42743 1          DLOAD* DAD*
0199  REF  4 LAST 456       35,2276  75160 1                 ALK +12D,2
0201  REF  3 LAST 455       35,2277  75074 0                 ALDK +12D,2
0202  REF  5 LAST 456       35,2300  12617 1          STORE  ALK +12D,2
0203                        35,2301  42673 0          DMPR*  DAD*
0204  REF  5 LAST 456       35,2302  75062 1                 DELM +8D,2
0205  REF  6 LAST 456       35,2303  75132 0                 INTY +16D,2
0206  REF  7 LAST 456       35,2304  12645 0          STORE  INTY +16D,2
02061                       35,2305  40743 0          DLOAD* DMP*
0207  REF  1                35,2306  33326 0                 ALSK +1,1
0209  REF  6 LAST 456       35,2307  75062 1                 DELM +8D,2
0210                        35,2310  42772 0          SL1R   DAD*
0211  REF  4 LAST 455       35,2311  75122 1                 VLAJN +8D,2
0212  REF  5 LAST 456       35,2312  12655 1          STORE  VLAJN +8D,2
0213                        35,2313  76104 0          TIX,2  AXT,1
0214  REF  1                35,2314  72264 1                 ALKLP
0215                        35,2315  00010 0                 8D


0216                        35,2316  64743 0  LOOSE  DLOAD* PDDL*
0217  REF  2 LAST  46       35,2317  02657 1                 ACCND +8D,1
0218  REF  6 LAST 456       35,2320  02655 0                 VLAJN +8D,1
0219                        35,2321  55523 0          PDDL*  VDEF
0220  REF  1                35,2322  02665 0                 POSNV +8D,1
0221                        35,2323  76521 0          MXV    VSL1
0222  REF  4 LAST 412       35,2324  02721 1                 TRANSM1
0223                        35,2325  77745 1          DLOAD
0224  REF 240 LAST 455      35,2326  00145 1                 MPAC
0225  REF  2 LAST 456       35,2327  06665 1          STORE  POSNV +8D,1
02251                       35,2330  77745 1          DLOAD
0226  REF 241 LAST 456      35,2331  00150 0                 MPAC +3
0227  REF  7 LAST 456       35,2332  06655 1          STORE  VLAJN +8D,1
02271                       35,2333  77745 1          DLOAD
0228  REF 242 LAST 456      35,2334  00152 1                 MPAC +5
0229  REF  3 LAST 456       35,2335  06657 0          STORE  ACCND +8D,1
0230                        35,2336  77700 0          TIX,1
0231  REF  1                35,2337  72316 0                 LOOSE
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```
0232                        35,2340  76174 1          AXT,2  AXT,1    EVALUATE SINES AND COSINES
0233                        35,2341  00006 1                 6
0234                        35,2342  00002 0                 2
0235                        35,2343  57343 1  BOOP   DLOAD*  DMPR
0236  REF  1                35,2344  02637 1                 ANGX +2,1
0237  REF  1                35,2345  33331 0                 GEORGEJ
0238                        35,2346  77722 0          SR2R
0239                        35,2347  73406 1          PUSH   SIN
0240                        35,2350  56172 0          SL1R   XAD,1
0241  REF  2 LAST 364       35,2351  00046 0                 XI
0242                        35,2352  10021 0          STORE  16D,2
0243                        35,2353  77745 1          DLOAD
02435                       35,2354  77746 1          COS
0244                        35,2355  10027 0          STORE  22D,2    COSINES
0245                        35,2356  71304 0          TIX,2  DLOAD
0246  REF  1                35,2357  72343 0                 BOOP


0247                        35,2360  00017 1                 14D
0248                        35,2361  43312 0          SL2    DAD
0249  REF  8 LAST 456       35,2362  02625 1                 INTY
0250  REF  9 LAST 457       35,2363  16625 1          STODL  INTY
0251                        35,2364  00015 0                 12D
0252                        35,2365  56405 0          DMP    SL3R
0253                        35,2366  00025 0                 20D
0254                        35,2367  77615 0          DAD
0255  REF  1                35,2370  02631 1                 INTZ
0256  REF  2 LAST 457       35,2371  16631 1          STODL  INTZ
0257                        35,2372  00021 1                 16D
0258                        35,2373  57275 0          DMPR   DMPR
0259                        35,2374  00023 0                 18D
0260                        35,2375  00017 1                 14D
0261                        35,2376  77712 0          SL2
0262                        35,2377  57325 1          PDDL   DMPR
0263                        35,2400  00013 0                 10D
0264                        35,2401  00015 0                 12D
0265                        35,2402  77615 0          DAD
0266                        35,2403  77675 0          DMPR
0267  REF  2 LAST 412       35,2404  02573 1                 WANGT
0268                        35,2405  57325 1          PDDL   DMPR
0269                        35,2406  00023 0                 18D
0270                        35,2407  00025 0                 20D
0271                        35,2410  66405 0          DMP    SL2R
0272  REF  2 LAST 412       35,2411  02571 0                 WANGO
0273                        35,2412  77621 1          BDSU
0274  REF  2 LAST 414       35,2413  02637 1                 DRIFTO
0275                        35,2414  45425 0          DSU    STADR
0276  REF  1                35,2415  61156 1          STODL  WPLATO
0277                        35,2416  00021 1                 16D
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```
0278                        35,2417  41275 1        DMPR    DMP
0279                        35,2420  00025 0                ZOD
0280  REF  3 LAST 457       35,2421  02573 1                WANGT
0281                        35,2422  77732 1        SL2R
0282                        35,2423  57325 1        PDDL    DMPR
0283  REF  3 LAST 457       35,2424  02571 0                WANGO
0284                        35,2425  00017 1                14D
0285                        35,2426  77615 0        DAD
0286  REF  2 LAST 412       35,2427  02641 0                DRIFTI
0287                        35,2430  77625 0        DSU
0288                        35,2431  57325 1        PDDL    DMPR
0289  REF  2 LAST  46       35,2432  02575 1                WANGT
0290  REF  4 LAST 458       35,2433  02573 1                WANGT
0291                        35,2434  45415 0        DAD     STADR
0292  REF  1                35,2435  61062 1        STODL   WPLATI
0293                        35,2436  00023 0                18D
0294                        35,2437  76405 1        DMP     SL1R
0295                        35,2440  00013 0                10D
0296                        35,2441  57325 1        PDDL    DMPR
0297                        35,2442  00015 0                12D
0298                        35,2443  00021 1                16D
0299                        35,2444  76405 1        DMP     SL1R
0300                        35,2445  00017 1                14D
0301                        35,2446  77621 1        BDSU
0302                        35,2447  77675 0        DMPR
0303  REF  5 LAST 458       35,2450  02573 1                WANGT
0304                        35,2451  57325 1        PDDL    DMPR
0305                        35,2452  00015 0                12D
0306                        35,2453  00025 0                20D
0307                        35,2454  76405 1        DMP     SL1R
0308  REF  4 LAST 458       35,2455  02571 0                WANGO
0309                        35,2456  77621 1        BDSU
0310  REF  4 LAST 430       35,2457  02577 0                DRIFTT
0311                        35,2460  77615 0        DAD             WPLATT NOW IN MPAC
0312                        35,2461  77606 1        PUSH            PUSH IT DOWN-X IT BY SANG +2
0313                        35,2462  74475 1        DMPR    SR1R
0314                        35,2463  00015 0                12D
0315                        35,2464  57325 1        PDDL    DMPR
0316  REF  2 LAST 457       35,2465  02621 0                WPLATO
0317                        35,2466  00023 0                18D
0318                        35,2467  77615 0        DAD
0319                        35,2470  77671 1        DDV
0320                        35,2471  00025 0                20D
0321                        35,2472  57206 1        PUSH    DMPR
0322  REF  1                35,2473  33333 1                GEORGEK
0323                        35,2474  43261 0        SRR     DAD
0324                        35,2475  21616 0                13D
0325  REF  2 LAST 457       35,2476  02635 0                ANGX
0326  REF  3 LAST 458       35,2477  16635 0        STODL   ANGX
0327                        35,2500  43275 0        DMPR    DAD
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0328                          35,2501   00017 1                 14D
0329  REF  2 LAST 458         35,2502   02715 0                 WPLAT1
0330                          35,2503   54275 0           DMPR  SRR
0331  REF  2 LAST 458         35,2504   33333 1                 GEORGEK
0332                          35,2505   21616 0                 13D
0333                          35,2506   77615 0           DAD
0334  REF  1                  35,2507   02633 0                 ANGY
0335  REF  2 LAST 459         35,2510   16633 0           STODL ANGY
0336                          35,2511   00023 0                 18D
0337                          35,2512   76405 1           DMP   SL1R        MULTIPLY X WPLATT =SL1= PUSH AND RELOAD
0338                          35,2513   57325 1           DDDL  DMPR
0339                          35,2514   00015 0                 12D
0340  REF  3 LAST 458         35,2515   02621 0                 WPLAT0
0341                          35,2516   77621 1           BDSU
0342                          35,2517   54275 0           DMPR  SRR
0343  REF  3 LAST 459         35,2520   33333 1                 GEORGEK
0344                          35,2521   21616 0                 13D
0345                          35,2522   77615 0           DAD
0346  REF  1                  35,2523   02627 0                 ANGZ
0347  REF  2 LAST 459         35,2524   02627 0           STORE ANGZ
0348                          35,2525   77404 1           BOVB  EXIT
0349  REF  1                  35,2526   72750 0                 SOMEERRR
0350  REF  10 LAST 452        35,2527   11527 1           CCS   LENGTHOT
03501 REF  2 LAST 452         35,2530   0 2717 1          TC    SLEEPIE
03502 REF  1                  35,2531   0 2664 1          TC    SETUPER1


0351                          35,2532   44743 1 ALWAYSG   DLOAD* DSU*       COMPASS AND ERECT
0352  REF  3 LAST 455         35,2533   02667 1                 DPIPAY +8D,1
0353  REF  1                  35,2534   02655 0                 FILDELV +8D,1
0354                          35,2535   42675 0           DMPR  DAD*
0355  REF  1                  35,2536   33336 1                 GEOCONS1
0356  REF  2 LAST 459         35,2537   02655 0                 FILDELV +8D,1
0357  REF  3 LAST 459         35,2540   06655 1           STORE FILDELV +8D,1
0358                          35,2541   77613 0           DAD*
0359  REF  1                  35,2542   02657 1                 INTVEC +8D,1
0360  REF  2 LAST 459         35,2543   06657 0           STORE INTVEC +8D,1
0361                          35,2544   42675 0           DMPR  DAD*
0362  REF  1                  35,2545   33340 0                 GEOCONS2
0363  REF  4 LAST 459         35,2546   02655 0                 FILDELV +8D,1
0364                          35,2547   41475 1           DMPR  PUSH
0365  REF  2 LAST 459         35,2550   33336 1                 GEOCONS1
0366                          35,2551   67300 0           TIX,1 SLOAD
0367  REF  2 LAST 455         35,2552   72532 0                 ALWAYSG
0368  REF  2 LAST 452         35,2553   02747 1                 ERECTIME
0369                          35,2554   71254 1           BZE   DLOAD
0370  REF  1                  35,2555   72566 1                 COMPGS      COMPASS
0371  REF  1                  35,2556   02627 0                 THETAN +2
0372                          35,2557   45425 0           DSU   STADR
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```
0373  REF   2 LAST 459    35,2560  61150 1          STODL  THETAN +2
0374                      35,2561  77621 1          BDSJ
0375  REF   3 LAST 460    35,2562  02631 1                 THETAN +4
0376  REF   4 LAST 460    35,2563  02631 1          STORE  THETAN +4
0377                      35,2564  77650 1          GOTO
0378  REF   1             35,2565  72610 0                 ADDINDRF
0379                      35,2566  43345 1  COMPGS  DLOAD  DAD          COMPASS
0380  REF   5 LAST 460    35,2567  02625 1                 THETAN
0381  REF   5 LAST 459    35,2570  02645 1                 FILDELV
0382  REF   6 LAST 460    35,2571  16625 1          STODL  THETAN
0383  REF   6 LAST 460    35,2572  02645 1                 FILDELV
0384                      35,2573  44275 1          DMPR   BDSJ
0385  REF   1             35,2574  33342 1                 GEOCONS3
0386  REF   7 LAST 460    35,2575  02631 1                 THETAN +4
0387  REF   8 LAST 460    35,2576  16631 1          STODL  THETAN +4
0388  REF   7 LAST 460    35,2577  02651 1                 FILDELV +4
0389                      35,2600  44275 1          DMPR   BDSJ
0390  REF   2 LAST 460    35,2601  33342 1                 GEOCONS3
0391  REF   9 LAST 460    35,2602  02627 0                 THETAN +2
0392                      35,2603  41325 0          DDDL   DMP
0393  REF   3 LAST 459    35,2604  02653 0                 INTVEC +4
0394  REF   1             35,2605  33344 1                 GEOCONS4
0395                      35,2606  45421 1          BDSJ   STADR
0396  REF  10 LAST 460    35,2607  75150 1          STORE  THETAN +2
0397                      35,2610  77775 1  ADDINDRF VLOAD
0398  REF  11 LAST 460    35,2611  02625 1                 THETAN
0399  REF   4 LAST 336    35,2612  03564 0          STORE  COMPTORK      IN E7 FOR DOWNLINK.
0400                      35,2613  77776 1          EXIT

0404  REF  11 LAST 459    35,2614  11527 1  ENDGTSAL CCS    LENGTHOT     IS 5 SEC OVER-THE TIME TO TORQ PLATFORM
0405  REF   3 LAST 459    35,2615  0 2717 1         TC     SLEEPIE      NO-SET UP NEXT WAITLIST CALL FOR .5 SEC
0406  REF  14 LAST 422    35,2616  10 356 0         CCS    LGYRO        YES BUT ARE GYROS BUSY
0407  REF   2 LAST 452    35,2617  1 2772 0         TCF    ANNNNNN +2   BUSY-GET THEM .5 SECONDS FROM NOW


0408  REF   2 LAST 454    35,2620  0 3371 1         TC     CHKCOMED     SEE IF LAST TIME FOR COMPASS

0410  REF  48 LAST 455    35,2621  0 6112 0  LASTGTS  TC     INTPRET
04101                     35,2622  77775 1          VLOAD
04102 REF   5 LAST 396    35,2623  02772 1                 ERCOMP
04103 REF   1             35,2624  16617 0          STODL  THETAX
04104 REF   6 LAST 398    35,2625  02565 0                 TMARK
04105 REF   6 LAST 456    35,2626  02603 0          STORE  ALK
04106                     35,2627  77776 1          EXIT                 PREVIOUS SECTION WAS FOR RESTARTS

04107 REF  15 LAST 454    35,2630  0 4161 0  RESTAIER TC     PHASCHNG

0411                      35,2631  00255 0          DCT    00255
0415  REF  49 LAST 460    35,2632  0 6112 0         TC     INTPRET      ADD COMPASS COMMANDS INTO ERATE
```

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```
0416                    35,2633   64375 1            VLOAD   MXV
04161 REF  12 LAST 460  35,2634   02625 1                    THETAN
0417  REF   5 LAST 455  35,2635   02750 1                    GEOMTRX
04171                   35,2636   53372 1            VSL1    VAD
0418  REF   2 LAST 460  35,2637   02617 0                    THETAX
0419  REF   6 LAST 460  35,2640   16772 1            STODL   ERCOMP
04191 REF   7 LAST 460  35,2641   02603 0                    ALS
04192 REF   7 LAST 460  35,2642   02565 0            STORE   TMARK
0420                    35,2643   77776 1            EXIT
0421  REF 113 LAST 454  35,2644   0 5206 0           TC      BANKCALL
04211 REF   7 LAST 419  35,2645   30424 0            CADR    EARTHR          TORQUE IT ALL IN
04212 REF   3 LAST 459  35,2646   3 1746 0           CA      ERECTIME
0422  REF   3 LAST 453  35,2647   55716 1            TS      GEOSAVED
04221 REF   2 LAST  68  35,2650   1 2757 1  RESTEST1 TCF     NOCHORLD


04223                   35,2651   0 0004 0  REDO3.27 INHINT                  PRELAUNCH DONE
042231 REF  6 LAST 389  35,2652   0 4133 1           TC      CHECKMM
042232                  35,2653   00011 1            OCT     11              SEE IF LIFTOFF IS DISPLAYED
042233                  35,2654   0 2656 0           TC      +2              NO ; DISPLAY MM 7.
042234 REF 55 LAST 399  35,2655   1 5567 1           TCF     ENDOFJOB        LIFTOFF DISPLAYED - IGNORE MM 7.

04224 REF  10 LAST 452  35,2656   0 4117 1           TC      NEWMODEX        PRELAUNCH DONE
0423                    35,2657   00007 0            OCT     7               DISPLAY MAJOR MODE 7
04235 REF 153 LAST 453  35,2660   3 7767 0           CAF     ZERO
04236 REF   4 LAST 453  35,2661   0 4246 0           TC      NEWPHASE        TURN OFF FINAL PRELAUNCH PROTECTION.
04237                   35,2662   00003 1            OCT     00003

0424  REF  56 LAST 461  35,2663   1 5567 1           TCF     ENDOFJOB        TERMINATE PRELAUNCH


0458  REF  50 LAST 460  35,2664   0 6112 0  SETUPER1 TC      INTPRET
0459                    35,2665   65345 0            DLOAD   PDDL            ANGLES FROM DRIFT TEST ONLY
0460  REF   3 LAST 459  35,2666   02627 0                    ANGZ
0461  REF   3 LAST 459  35,2667   02633 0                    ANGY
0462                    35,2670   55525 0            PDDL    VDEF
0463  REF   4 LAST 458  35,2671   02635 0                    ANGX
0464                    35,2672   74276 1            VCOMP   VXSC
0465  REF   2 LAST 457  35,2673   33331 0                    GEORGEJ
0466                    35,2674   74521 1            MXV     VSR1
0467  REF   6 LAST 461  35,2675   02750 1                    GEOMTRX
0468  REF  12 LAST 449  35,2676   02501 1            STORE   OGC
0469                    35,2677   77776 1            EXIT


0470  REF  16 LAST 460  35,2700   0 4161 0  TORQINCH TC      PHASCHNG
0471                    35,2701   00175 1            OCT     00175
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```
0472  REF   1                35,2702  3 3317 1    CA    AINGYRO
0473  REF 114 LAST 461       35,2703  0 5206 0    TC    BANKCALL
0474  REF   4 LAST 426       35,2704    26362 1   CADR  IMUPULSE
0475  REF 115 LAST 462       35,2705  0 5206 0    TC    BANKCALL
0476  REF  29 LAST 447       35,2706    26751 0   CADR  IMUSTALL
0477  REF   1                35,2707  0 2753 1    TC    SOMERR2     BAD GYRO TORQUE-END OF TEST
```

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```
0478   REF   5 LAST 414    35,2710  11'574 1  GEOSTRT4 CCS    TORQNDX     ONLY POSITIVE IF IN VERTICAL DRIFT TEST
0479   REF   1             35,2711  0 2715 0           TC     GEOBAVR     VERT DRIFT TEST OVER
0480   REF   2 LAST 452    35,2712  0 2773 0           TC     SETUPER     SET UP ERATE FOR PIPTEST OR COMPASS
0483   REF 116 LAST 462    35,2713  0 5206 0           TC     BANKCALL    GO TO IMU2 FOR A PIPA TEST AND DISPLAY
0484   REF   1             35,2714   50102 1           CADR   TORQUE

0485   REF 117 LAST 463    35,2715  0 5206 0  GEOBAVR  TC     BANKCALL
0486   REF   1             35,2716   50230 0           CADR   VALMIS      DISPLAY VERTICAL DRIFT
```

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```
R04861  SET UP WAITLIST SECTION
 0487   REF  12 LAST 460   35,2717   55,527 1  SLEEPIE   TS     LENGTHOT      TEST NOT OVER-DECREMENT LENGTHOT
 0488   REF  17 LAST 461   35,2720   0 4161 0             TC     PHASCHNG      CHANGE PHASE
 0489                      35,2721    00135 0             OCT    00135
 0490   REF   6 LAST 463   35,2722   11,574 1             CCS    TORQNDX       ARE WE DOING VERTDRIFT
 0491   REF   1            35,2723   0 2725 0             TC     EARTTPRQ      YES,DO HOR ERATE TORQ THEN SLEEP
 0492   REF   2 LAST  68   35,2724   0 2727 1             TC     WTLISTNT      GO TO SET UP NEXT WAITLIST
 0493   REF 118 LAST 463   35,2725   0 5206 0  EARTTPRQ  TC     BANKCALL      IN VERTDRIFT,ADD HOR ERATE AND SLEEP
 0494   REF   8 LAST 461   35,2726    30424 0             CADR   EARTHR
 0495   REF   3 LAST 460   35,2727   0 3371 1  WTLISTNT  TC     CHKCOMED      SEE IF GYROCOMPASS OVER

 04951                     35,2730   0 0004 0             INHINT
 0496   REF  11 LAST 453   35,2731   4 0025 1             CS     TIME1
 0497   REF   4 LAST 454   35,2732   6 1745 0             AD     GTSWTLST
 0498                      35,2733   0 0006 1             EXTEND
 0499                      35,2734   6 2736 1             BZMF   +2
 0500   REF   2 LAST 366   35,2735   6 7745 0             AD     NEGMAX
 0501   REF   2 LAST 411   35,2736   6 1744 1             AD     1SECXT        1 SEC FOR CALIBRATION,,5 SEC IN COMPASS
 0502                      35,2737   0 0006 1             EXTEND
 0503   REF   1            35,2740   6 2746 0             BZMF   RIGHTGTS
 0504   REF  57 LAST 447   35,2741   0 5663 1  WTGTSMPL  TC     WAITLIST
 05045  REF  57 LAST 453                 E5               EBANK= XSM
 0505                      35,2742    02062 1             2CADR  ALLDONE
C0505   REF   1            35,2743    72065 1
 0506                      35,2744   0 0003 1             RELINT
 0507   REF  57 LAST 461   35,2745   0 5567 0             TC     ENDOFJOB
 0508   REF  55 LAST 446   35,2746   3 7762 0  RIGHTGTS  CAF    TWO
 0509   REF   1            35,2747   0 2741 1             TC     WTGTSMPL


 0510   REF  35 LAST 417   35,2750   0 4755 1  SOMEERRR  TC     ALARM
 0511                      35,2751    01600 0             OCT    1600
 0512                      35,2752   0 2755 1             TC     +3
 0513   REF  36 LAST 464   35,2753   0 4755 1  SOMERR2   TC     ALARM
 0514                      35,2754    01601 1             OCT    1601
 0515   REF 119 LAST 464   35,2755   0 5206 0             TC     BANKCALL
 0516   REF  26 LAST 440   35,2756    30770 1             CADR   ENDTEST
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```
0519  REF  18 LAST 464   35,2757  0 4161 0  NOCHORLD  TC      PHASCHNG
0520                     35,2760    00155 0            OCT     00155

0521  REF  51 LAST 461   35,2761  0 6112 0            TC      INTPRET
0522                     35,2762    77775 1            VLOAD
0523  REF   2 LAST 429   35,2763    33300 1                    SCHZFROS
0525  REF  13 LAST 461   35,2764    02625 1            STORE   THETAN
0526                     35,2765    77776 1            EXIT
0527  REF   4 LAST 461   35,2766  11'716 1            CCS     GEOSAVED
0528  REF   4 LAST 461   35,2767  55'746 1            TS      ERECTIME        COUNTS DOWN FOR ERECTION

0529  REF   2 LAST 409   35,2770  3 4530 0  ANNNNNN   CAF     NINE
0530  REF  13 LAST 464   35,2771  55'527 1            TS      LENGTHOT
0532  REF   4 LAST 460   35,2772  0 2720 0            TC      SLEEPIE +1


0536                     35,2773  0 0006 1  SETUPER   EXTEND                  SUBROUTINE CALLED IN 3 PLACES
0537  REF   6 LAST 435   35,2774  23'547 0            DXCH    QPLACES
0538  REF  52 LAST 465   35,2775  0 6112 0            TC      INTPRET
0539                     35,2776    77624 1            CALL
0540  REF   3 LAST 410   35,2777    30407 1                    ERTHRVSE
0541                     35,3000    77776 1            EXIT
0542  REF 120 LAST 464   35,3001  0 5206 0            TC      BANKCALL
0543  REF   3 LAST 410   35,3002    30752 1            CADR    DGCZERO
0544  REF   7 LAST 465   35,3003  0 1547 0            TC      QPLACES
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 17 S3 E5

```
0578  REF   3 LAST 226                    5352  GEOBND    =       EBANK3
0579  REF   2 LAST  88                    5661  GEOBND1   =       EBANK5
0581  REF   1                 35,3004  3 5352 0  STOREDTA  CAF     GEOBND
0582  REF  85 LAST 442        35,3005  54 001 1            TS      L
0583  REF   2 LAST 452        35,3006  3 3315 0            CAF     77DECML
0584  REF 243 LAST 456        35,3007  54 144 1            TS      MPAC
0585  REF 244 LAST 466        35,3010  50 144 0            INDEX   MPAC
0586  REF   4 LAST 455        35,3011  3 1600 0            CA      ALX1S
0587  REF  22 LAST 408        35,3012  22 003 1            LXCH    EBANK
0588  REF   1                                 E3          EBANK=  RESTRTCS
0589  REF 245 LAST 466        35,3013  50 144 0            INDEX   MPAC
0590  REF   2 LAST 466        35,3014  55'600 1            TS      RESTRTCS
0591  REF  23 LAST 466        35,3015  22 003 1            LXCH    EBANK
0592  REF  58 LAST 464                        E5          EBANK=  XSM
0593  REF 246 LAST 466        35,3016  10 144 1            CCS     MPAC
0594                          35,3017  1 3021 0            TCF     +2
0595  REF 172 LAST 445        35,3020  0 0002 0            TC      Q
0596  REF 247 LAST 466        35,3021  54 144 1            TS      MPAC
0597  REF   2 LAST 466        35,3022  3 5352 0            CAF     GEOBND
0598  REF  86 LAST 466        35,3023  54 001 1            TS      L
0599  REF   2 LAST 454        35,3024  1 3010 1            TCF     STOREDTA +4


0600  REF   3 LAST 466        35,3025  3 3315 0  LOADSTDT  CAF     77DECML
0601  REF 248 LAST 466        35,3026  54 144 1            TS      MPAC
0602  REF   3 LAST 466        35,3027  3 5352 0            CA      GEOBND
0603  REF  24 LAST 466        35,3030  56 003 1            XCH     EBANK
0604  REF  87 LAST 466        35,3031  54 001 1            TS      L
0605  REF   3 LAST 466                        E3          EBANK=  RESTRTCS
0606  REF 249 LAST 466        35,3032  50 144 0            INDEX   MPAC
0607  REF   4 LAST 466        35,3033  3 1600 0            CA      RESTRTCS
0608  REF  25 LAST 466        35,3034  22 003 1            LXCH    EBANK
0609  REF  59 LAST 466                        E5          EBANK=  XSM
0610  REF 250 LAST 466        35,3035  50 144 0            INDEX   MPAC
0611  REF   5 LAST 466        35,3036  55'600 1            TS      ALX1S
0612  REF 251 LAST 466        35,3037  10 144 1            CCS     MPAC
0613                          35,3040  1 3042 0            TCF     +2
0614  REF 173 LAST 466        35,3041  0 0002 0            TC      Q
0615  REF 252 LAST 466        35,3042  54 144 1            TS      MPAC
0616  REF   2 LAST 454        35,3043  1 3027 0            TCF     LOADSTDT +2
```

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```
0617                          35,3044  0 0006 1  LOADXSM  EXTEND
0618  REF   8 LAST 465       35,3045  23'547 0           DXCH   QPLACES
0619  REF   1                 35,3046  3 3346 0           CAF    17DECML
0620  REF 253 LAST 466        35,3047  54 144 1           TS     MPAC
0621  REF 225 LAST 453        35,3050  50 000 1           INDEX  A
0622  REF   2 LAST  46        35,3051  3 1720 0           CA     PRELMTRX
0623  REF 254 LAST 467        35,3052  50 144 0           INDEX  MPAC
0624  REF  70 LAST 466        35,3053  55'400 0           TS     XSM
0625  REF 255 LAST 467        35,3054  10 144 1           CCS    MPAC
0626  REF   2 LAST 432        35,3055  1 3047 0           TCF    LOADXSM +3
0627  REF   9 LAST 467        35,3056  0 1547 0           TC     QPLACES
0628                          35,3057  77743 1  ALFDK     DEC    -28          SLOPES AND TIME CONSTANTS FOR FIRST 30SC
0629                          35,3060  77776 1            DEC    -1
0630                          35,3061  35143 1            2DEC   .91230833    TIME CONSTANTS-PIPA OUTPUTS
C0630                         35,3062  10237 0
0631                          35,3063  31766 1            2DEC   .81193187    TIME CONSTANT-ERECTION ANGLES
C0631                         35,3064  26106 1
0632                          35,3065  77772 0            2DEC   -.00035882   SLOPE-AZIMUTH ANGLE
C0632                         35,3066  43677 0
0633                          35,3067  77777 0            2DEC   -.00000029   SLOPE-VERTICAL DRIFT
C0633                         35,3070  77661 0
0634                          35,3071  00002 0            2DEC   .00013262    SLOPE-NORTH SOUTH DRIFT
C0634                         35,3072  05420 1

0635                          35,3073  77705 0            DEC    -58          31-90 SEC
0636                          35,3074  77776 1            DEC    -1
0637                          35,3075  37560 0            2DEC   .99192133
C0637                         35,3076  05346 0
0638                          35,3077  37522 0            2DEC   .98940595
C0638                         35,3100  15525 1
0639                          35,3101  77763 0            2DEC   -.00079010
C0639                         35,3102  41604 0
0640                          35,3103  77777 0            2DEC   -.00000265
C0640                         35,3104  76470 0
0641                          35,3105  00007 0            2DEC   .00043154
C0641                         35,3106  02201 0

0642                          35,3107  77767 1            DEC    -8           91-100 SEC
0643                          35,3110  77776 1            DEC    -1
0644                          35,3111  37773 0            2DEC   .99971021
C0644                         35,3112  10042 0
0645                          35,3113  37747 1            2DEC   .99852047
C0645                         35,3114  30232 1
0646                          35,3115  00006 1            2DEC   .00042697
C0646                         35,3116  37666 0
0647                          35,3117  77777 0            2DEC   -.00000213
C0647                         35,3120  76703 1
0648                          35,3121  00001 0            2DEC   .00011864
C0648                         35,3122  36147 0
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 19 S3 E5

0649	35,3123	77635 1	DEC	-98	101-200 SEC	
0650	35,3124	77776 1	DEC	-1		
0651	35,3125	37666 0	2DEC	.99560063		
C0651	35,3126	11022 1				
0652	35,3127	37532 1	2DEC	.98992124		
C0652	35,3130	33647 1				
0653	35,3131	00007 0	2DEC	.00043452		
C0653	35,3132	03641 1				
0654	35,3133	77777 0	2DEC	-.00000401		
C0654	35,3134	75713 0				
0655	35,3135	77774 0	2DEC	-.00021980		
C0655	35,3136	54605 0				
0656	35,3137	77407 1	DEC	-248	201-450 SEC	
0657	35,3140	77776 1	DEC	-1		
0658	35,3141	37712 1	2DEC	.99673264		
C0658	35,3142	16755 1				
0659	35,3143	37630 0	2DEC	.99365467		
C0659	35,3144	01160 1				
0660	35,3145	00000 1	2DEC	.00003767		
C0660	35,3146	23600 0				
0661	35,3147	77777 0	2DEC	-.00002317		
C0661	35,3150	63663 1				
0662	35,3151	77777 0	2DEC	-.00003305		
C0662	35,3152	56527 1				
0663	35,3153	77255 0	DEC	-338	451-790 SEC	
0664	35,3154	77776 1	DEC	-1		
0665	35,3155	37763 1	2DEC	.99934362		
C0665	35,3156	23341 0				
0666	35,3157	37755 1	2DEC	.99888274		
C0666	35,3160	26170 0				
0667	35,3161	00000 1	2DEC	.00000064		
C0667	35,3162	00254 1				
0668	35,3163	77777 0	2DEC	-.00004012		
C0668	35,3164	52755 1				
0669	35,3165	77777 0	2DEC	-.00000195		
C0669	35,3166	76764 0				
0670	35,3167	77147 0	DEC	-408	791-1200 SEC	
0671	35,3170	77776 1	DEC	-1		
0672	35,3171	37772 1	2DEC	.99943845		
C0672	35,3172	02343 1				
0673	35,3173	37761 0	2DEC	.99913162		
C0673	35,3174	30560 1				
0674	35,3175	00000 1	2DEC	.00000090		
C0674	35,3176	00362 0				

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 20 S3 E5

```
0675            35,3177  00000 1        2DEC   .00002927
C0675           35,3200  17261 1
0676            35,3201  77777 0        2DEC   -.00000026
C0676           35,3202  77671 1

0677            35,3203  77015 0        DEC    -498          1201-1700 SEC
0678            35,3204  77776 1        DEC    -1
0679            35,3205  37765 1        2DEC   .99934865
C0679           35,3206  12403 0
0680            35,3207  37752 0        2DEC   .99868793
C0680           35,3210  20062 1
0681            35,3211  00000 1        2DEC   .00000055
C0681           35,3212  00224 0
0682            35,3213  00000 1        2DEC   .00001183
C0682           35,3214  06150 0
0683            35,3215  77777 0        2DEC   -.00000005
C0683           35,3216  77762 1

0684            35,3217  77161 1        DEC    -398          1701-2100 SEC
0685            35,3220  77776 1        DEC    -1
0686            35,3221  37767 0        2DEC   .99947099
C0686           35,3222  12513 0
0687            35,3223  37756 1        2DEC   .99894799
C0687           35,3224  30343 0
0688            35,3225  00000 1        2DEC   .00000018
C0688           35,3226  00060 1
0689            35,3227  00000 1        2DEC   .00000300
C0689           35,3230  01445 0
0690            35,3231  77777 0        2DEC   -.00000001
C0690           35,3232  77774 0

0691            35,3233  76651 1        DEC    -598          2101-2700 SEC
0692            35,3234  77776 1        DEC    -1
0693            35,3235  37771 1        2DEC   .99957801
C0693           35,3236  02603 0
0694            35,3237  37762 0        2DEC   .99916095
C0694           35,3240  10061 1
0695            35,3241  00000 1        2DEC   .00000007
C0695           35,3242  00023 0
0696            35,3243  00000 1        2DEC   .00000096
C0696           35,3244  00402 1
0697            35,3245  00000 1        2DEC   .00000000
C0697           35,3246  00000 1

0698            35,3247  76505 0        DEC    -698          2700-3400 SEC
0699            35,3250  77776 1        DEC    -1
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 21 S3 E5

```
 0700                    35,3251  37772 1            2DEC   .99966814
C0700                    35,3252  22005 1
 0701                    35,3253  37765 1            2DEC   .99993952
C0701                    35,3254  05560 1
 0702                    35,3255  00000 1            2DEC   .00000002
C0702                    35,3256  00005 1
 0703                    35,3257  00000 1            2DEC   .00000028
C0703                    35,3260  00113 1
 0704                    35,3261  00000 1            2DEC   .00000000
C0704                    35,3262  00000 1

 0705                    35,3263  76651 1            DEC    -598          3401-4000 SEC
 0706                    35,3264  77776 1            DEC    -1
 0707                    35,3265  37773 0            2DEC   .99972716
C0707                    35,3266  20750 1
 0708                    35,3267  37767 0            2DEC   .99945654
C0708                    35,3270  03044 1
 0709                    35,3271  00000 1            2DEC   .00000001
C0709                    35,3272  00003 1
 0710                    35,3273  00000 1            2DEC   .00000010
C0710                    35,3274  00033 1
 0711                    35,3275  00000 1            2DEC   .00000000
C0711                    35,3276  00000 1

 0712                    35,3277  00000 1  SCHZEROS  2DEC   .00000000
C0712                    35,3300  00000 1
 0713                    35,3301  00000 1            2DEC   .00000000
C0713                    35,3302  00000 1
 0714                    35,3303  00000 1            2DEC   .00000000
C0714                    35,3304  00000 1
 0715                    35,3305  00004 0  INTVAL    OCT    4
 0716                    35,3306  00002 0            OCT    2
 0717                    35,3307  00220 1            DEC    144
 0718                    35,3310  77776 1            DEC    -1
 0719                    35,3311  35730 0  SQUPLY    2DEC   .93505870     INITIAL GAINS FOR PIP OUTPUTS
C0719                    35,3312  00035 1
 0720                    35,3313  10317 0            2DEC   .26226423     INITIAL GAINS/4 FOR ERECTION ANGLES
C0720                    35,3314  17550 1

 0721                    35,3315  00115 1  77DECML   DEC    77
 0722  REF  6 LAST 466   35,3316  01577 0  ALXXXZ    GENADR ALX1S -1
 0723  REF  13 LAST 461  35,3317  02500 0  AINGYRO   ECADR  OGC
 0724                    35,3320  04133 1  PIPASC    2DEC   .13055869
C0724                    35,3321  02265 1
 0726                    35,3322  57223 0  VELSC     2DEC   -.52223476     512/980.402
C0726                    35,3323  66451 1
 0727                    35,3324  05427 0  ALSK      2DEC   .17329931     SSWAY VEL GAIN X 980.402/4096
C0727                    35,3325  12577 1
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 22 S3 E5

```
 0728                          35,3326   77567 0          2DEC   -.00835370    SSWAY ACCEL GAIN X 980.402/4096
C0728                          35,3327   44202 1

 0731                          35,3330   24276 1  GEORGEJ 2DEC   .63641977
C0731                          35,3331   14066 1
 0732                          35,3332   23073 1  GEORGEK 2DEC   .59737013
C0732                          35,3333   11773 1
 07325                         35,3334   00023 0  SCHOCT23 OCT   00023
 0733                          35,3335   03146 1  GEOCONS1 2DEC  .1
C0733                          35,3336   14632 0
 0734                          35,3337   00121 0  GEOCONS2 2DEC  .005
C0734                          35,3340   35341 1
 0735                          35,3341   00631 0  GEOCONS3 2DEC  .025
C0735                          35,3342   23146 0
 0736                          35,3343   00000 1  GEOCONS4 2DEC  .00003
C0736                          35,3344   17565 1
 07362                         35,3345   06200 0  1/PIPAGT OCT   06200
 0737                          35,3346   00021 1  17DECML  DEC   17
 0738                          35,3347   00023 0  19DECML  DEC   19
 0739                          35,3350   00062 0  1/2SECX  DEC   50


 0740   REF 120 LAST 452       35,3351   3 7763 1 GTSCPSS  CA    ONE
 0741   REF   8 LAST 455       35,3352   55'742 0         TS    GEOCOMPS       THIS IS THE LEAD IN FOR COMPASS
 0743   REF  11 LAST 461       35,3353   0 4117 1         TC    NEWMODEX
 074417                        35,3354    00001 0         OCT   01
 074518 REF   1                35,3355   3 3345 0         CA    1/PIPAGT
 074619 REF   2 LAST  24       35,3356   54 765 1         TS    1/PIPADT
 07472  REF   3 LAST 310       35,3357   3 7764 0         CA    ELEVEN         COMPASS IS POSITION 11
 074721 REF  16 LAST 446       35,3360   55'544 1         TS    POSITON
 074722 REF  14 LAST 425       35,3361   3 7754 0         CA    BIT8           620 SECONDS ERECTING
 074723 REF  14 LAST 465       35,3362   55'527 1         TS    LENGTHOT
 074724 REF   1                35,3363   3 3350 1         CAF   1/2SECX        COMPASS IS A .5 SEC LOOP
 074725 REF   3 LAST 464       35,3364   55'744 0         TS    1SECXT
 074922 REF 154 LAST 461       35,3365   3 7767 0         CAF   ZERO
 075023 REF   5 LAST 432       35,3366   55'536 1         TS    NBPOS
 0781   REF 121 LAST 465       35,3367   0 5206 0         TC    BANKCALL
 0782   REF   1                35,3370    50014 1         CADR  GEOIMUTT


 0783   REF  11 LAST 425       35,3371   3 0075 0 CHKCOMED CA    FLAGWRD1       CHECK FOR END OF COMPASS
 0784   REF  20 LAST 406       35,3372   7 7762 1         MASK  BIT2           TEST FOR GRR FLAG
 0785   REF 226 LAST 467       35,3373   10 000 0         CCS   A
 0786   REF   1                35,3374   1 3376 1         TCF   PRELTERM       YES   GRR HAS OCCURRED
 0787   REF 174 LAST 466       35,3375   0 0002 0         TC    Q              NO    CONTINUE
```

L OPTIMUM PRELAUNCH ALIGNMENT CALIBRATION USER'S OWN PAGE NO. 23 S3 E5

```
 07885  REF  12 LAST 471     35,3376  0 4117 1  PRELTERM TC     NEWMODEX
 0789                        35,3377    00004 0            OCT    04              04 IS END OF COMPASS
 0790   REF   1              35,3400  1 2621 1            TCF    LASTGTS         GET LAST TORQUING


 0800                        35,3401    77214 0  GRRNOW    SET    VLOAD           COME HERE WHEN DELV CHECK SHOWS LIFTOFF
 0801   REF   1              35,3402    00475 1             GRRFLAG               TO HAVE OCCURRED.
 0802   REF   2 LAST 454     35,3403    00404 1             DELV
 0803   REF   2 LAST  33     35,3404    01765 1             STORE  DELVAUF
 0804                        35,3405    77531 0             SSP    EXIT
 08043  REF   3 LAST  64     35,3406    01743 0             DT-LIFT               START LIFTOFF 100 MS AFTER MP2TASK
 08046                       35,3407    00012 1             10D

 0805                        35,3410  0 0004 0            INHINT
 0806   REF   2 LAST 212     35,3411  3 5205 0            CAF    1SEC.1           DELAY TILL PRELAUNCH IF FINISHED, BUT
 0807   REF  58 LAST 464     35,3412  0 5663 1            TC     WAITLIST         NOT SO LONG THAT READACCS HAPPENS FIRST.
 0808   REF   5 LAST 464                 E5               EBANK= GTSWTLST
 0809                       35,3413    02446 0             2CADR  LIFTFIXT
C0809   REF   1              35,3414    56065 1
 0810                        35,3415  0 0003 1            RELINT
 0811   REF   2 LAST 471     35,3416  1 3376 1            TCF    PRELTERM
```

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L0010   DAP INTERFACE SUBROUTINES                          USER'S OWN PAGE NO.  1          S3

 0001                              20,2046          BANK   20
 0002   REF   3 LAST  99            E6             EBANK= DT
R0003   MOD 0            DATE  11/15/66        BY  GEORGE W. CHERRY

R0004   FUNCTIONAL DESCRIPTION

R0005           HEREIN ARE A COLLECTION OF SUBROUTINES WHICH ALLOW MISSION CONTROL PROGRAMS TO CONTROL THE MOD=
R0007           AND INTERFACE WITH THE DAP.

R0008   CALLING SEQUENCES

R0009   IN INTERRUPT OR WITH INTERRUPT INHIBITED
R0010           TC     IBNKCALL
R0011           FCADR  ROUTINE

R0012   IN A JOB WITHOUT INTERRUPT INHIBITED
R00121          INHINT
R0013           TC     IBNKCALL
R0014           FCADR  ROUTINE
R00141          RELINT

R0015   OUTPUT

R0016           SEE INDIVIDUAL ROUTINES BELOW

R0017   DEBRIS

R0018           A,L, AND SOMETIMES MOVETEMP
```

L0010 DAP INTERFACE SUBROUTINES USER'S OWN PAGE NO. 2 S3

R0019 DAPBOOLS BITS AND NAMES

0020	REF 32 LAST 452	7763	DJRRCBIT EQUALS BIT1	INTERNAL DAP RATE COMMAND ACTIVITY FLAG
0021	REF 21 LAST 471	7762	TRYGIMBL EQUALS BIT2	TRIM GIMBAL FLAG
0022	REF 17 LAST 405	7761	DATAGOOD EQUALS BIT3	RECIPROCAL ACCELERATIONS OKAY FLAG
0023	REF 27 LAST 423	7760	ACC4OR2X EQUALS BIT4	2 OR 4 JET X-TRANSLATION MODE FLAG
0024	REF 21 LAST 445	7757	ADRBSYST EQUALS BIT5	P-AXIS ROTATION JET SYSTEM (A OR B) FLAG
0025	REF 31 LAST 439	7756	JLLAGER EQUALS BIT6	INTERNAL ULLAGE REQUEST FLAG
0026	REF 27 LAST 405	7755	DBSELECT EQUALS BIT7	DAP DEADBAND SELECT FLAG
0027	REF 15 LAST 471	7754	APSGOING EQUALS BIT8	ASCENT PROPULSION SYSTEM BURN FLAG
0028	REF 7 LAST 436	7753	VIZPHASE EQUALS BIT9	DESCENT VISIBILITY PHASE FLAG
0029	REF 36 LAST 446	7752	PULSES EQUALS BIT10	MINIMUM IMPULSE RHC MODE FLAG
0030	REF 23 LAST 447	7751	GODAPGO EQUALS BIT11	DAP ENABLING FLAG
0031	REF 21 LAST 358	7750	MASSGOOD EQUALS BIT12	MASS OKAY FLAG

R0032 STILL AVAILABLE BIT13

0033	REF 30 LAST 372	7746	AUTORHLD EQUALS BIT14	AUTOMATIC MODE RATE HOLD FLAG
0034	REF 28 LAST 315	7745	SPSBACUP EQUALS BIT15	SPS BACKUP DAP FLAG

003401 REF 1 7762 USEQRJTS EQUALS TRYGIMBL ALTERNATE TRIM GIMBAL FLAG

R003405 R00341 R003415 LOCATION	BIT NUMBER	FLAGWORD SYMBOL	SWITCH NUMBER	SWITCH SYMBOL	ON-STATE INDICATES	OFF-STATE INDICATES
R00342 DAPBOOLS R003425	1	DJRRCBIT	59		INTERNAL RATE COMMAND ACTIVITY	NO INTERNAL RATE COMMAND ACTIVITY (LOCKED ON 0)
R00343 R003435	2	TRYGIMBL	58		TRIM GIMBAL CONTROL IMPOSSIBLE	TRIM GIMBAL CONTROL POSSIBLE
R00344 R003444	3	DATAGOOD	57		RECIPROCAL ACCELERATION PROBABLY CORRECT	RECIPROCAL ACCELERATION PROBABLY INCORRECT
R00345 R003455 R00346	4	ACC4OR2X	56		P-AXIS 4 JET X-TRANSLATION MODE (LOCKED ON 1)	P-AXIS 2 JET X-TRANSLATION MODE
R003465 R00347	5	ADRBSYST	55		P-FORCE COUPLES 15, 7 AND 16, 8	P-FORCE COUPLES 4, 12 AND 3, 11
R003475	6	JLLAGER	54		INTERNAL ULLAGE REQUEST	NO INTERNAL ULLAGE REQUEST
R00348	7	DBSELECT	53		MAX DEADBAND SELECT	MIN DEADBAND SELECT
R003485 R00349	8	APSGOING	52		ASCENT PROPULSION SYSTEM BURN	APS OFF
R003495 R0035	9	VIZPHASE	51		DESCENT VISIBILITY PHASE (LOCKED ON 1)	NOT IN DESCENT VISIBILITY PHASE
R003505 R00351	10	PULSES	50		MINIMUM IMPULSE RHC MODE	RATE COMMAND RHC MODE (LOCKED ON 0)
R003515	11	GODAPGO	49		DAP ENABLED	DAP IDLING
R00352 R003524	12	MASSGOOD	48		VALUE OF MASS PROBABLY CORRECT	VALUE OF MASS PROBABLY INCORRECT

L0010 DAP INTERFACE SUBROUTINES USER'S OWN PAGE NO. 3 S3

```
R00353          13          47          NOT AVAILABLE - STATE
R003535                                 IRRELEVANT
R00354          14  AUTORHLD 46         AUTOMATIC RATE HOLD MODE     AUTOMATIC ATTITUDE HOLD
R003545         15  SPSBACUP 45         NOT IN SPS BACK-UP DAP MODE  SPS BACK-UP DAP MODE
R00355                                  (LOCKED ON 1)


0039  REF   1              20,2046  3 6110 1  SETMINDB CAF   NARROWDB
0040  REF   1              20,2047  54 375 1            TS    DB
0041  REF   1              20,2050  4 7755 0            CS    DBSELECT
0042  REF  11 LAST 338     20,2051  7 0077 0            MASK  DAPBOOLS
0043  REF  12 LAST 475     20,2052  54 077 0            TS    DAPBOOLS
0046  REF 175 LAST 471     20,2053  0 0002 0            TC    Q

0051  REF   1              20,2054  3 6111 0  SETMAXDB CAF   WIDEDB
0052  REF   2 LAST 475     20,2055  54 375 1            TS    DB
0053  REF  13 LAST 475     20,2056  4 0077 0            CS    DAPBOOLS
0054  REF   2 LAST 475     20,2057  7 7755 0            MASK  DBSELECT
0055  REF  14 LAST 475     20,2060  26 077 0            ADS   DAPBOOLS
0058  REF 176 LAST 475     20,2061  0 0002 0            TC    Q

0060  REF  15 LAST 475     20,2062  4 0077 0  JLLAGE   CS    DAPBOOLS
0061  REF   1              20,2063  7 7756 0            MASK  JLLAGER
0062  REF  16 LAST 475     20,2064  26 077 0            ADS   DAPBOOLS
0064  REF 177 LAST 475     20,2065  0 0002 0            TC    Q

0066  REF   2 LAST 475     20,2066  4 7756 0  NOJLLAGE CS    JLLAGER
0067  REF  17 LAST 475     20,2067  7 0077 0            MASK  DAPBOOLS
0068  REF  18 LAST 475     20,2070  54 077 0            TS    DAPBOOLS
0070  REF 178 LAST 475     20,2071  0 0002 0            TC    Q

0075  REF   1              20,2072  1 2106 0  HOLDRATE TCF   COMMEXIT      REPLACE BY  CS DAPBOOLS  FOR RATE HOLD.
0076  REF   1              20,2073  7 7746 1            MASK  AUTORHLD
0077  REF  19 LAST 475     20,2074  26 077 0            ADS   DAPBOOLS

00772 REF   2 LAST 366     20,2075  3 5632 0            CAF   EBANK6
00774 REF  26 LAST 466     20,2076  56 003 1            XCH   EBANK
00776 REF   1              20,2077  54 776 0            TS    OMEGARD

0078                       20,2100  0 0006 1            EXTEND
0079  REF   7 LAST 336     20,2101  3 1416 0            DCA   OMEGAP
0080  REF   3 LAST  24     20,2102  52 775 0            DXCH  OMEGAPD
0081  REF   4 LAST 336     20,2103  31'420 0            CAE   OMEGAR
0082  REF   2 LAST 475     20,2104  56 776 1            XCH   OMEGARD

00822 REF  27 LAST 475     20,2105  54 003 0            TS    EBANK

0083                       20,2106  0 0006 1  COMMEXIT EXTEND
0084  REF  14 LAST 448     20,2107  3 0034 0            DCA   CDUY
```

L0010 DAP INTERFACE SUBROUTINES USER'S OWN PAGE NO. 4 S3 E6

```
0085  REF   3 LAST 338     20,2110  52 770 0          DXCH   CDUYD
0086  REF  26 LAST 448     20,2111  30 032 0          CAE    CDUX
0087  REF   5 LAST 337     20,2112  54 766 1          TS     CDUXD

0091  REF 179 LAST 475     20,2113  0 0002 0          TC     Q

0096  REF   2 LAST 475     20,2114  4 7746 1  STOPRATE CS     ADTOBHLD
0097  REF  20 LAST 475     20,2115  7 0077 0          MASK   DAPBOOLS
0098  REF  21 LAST 476     20,2116  54 077 0          TS     DAPBOOLS

0099  REF 155 LAST 471     20,2117  3 7767 0          CAF    ZERO
0100  REF   4 LAST 475     20,2120  54 774 1          TS     OMEGAPD
0101  REF   1              20,2121  54 775 0          TS     OMEGAQD
0102  REF   3 LAST 475     20,2122  54 776 0          TS     OMEGARD
0103  REF   4 LAST  32     20,2123  54 771 1          TS     DELCDUX
0104  REF   2 LAST  32     20,2124  54 772 1          TS     DELCDUY
0105  REF   2 LAST  32     20,2125  54 773 0          TS     DELCDUZ
0106  REF   2 LAST 475     20,2126  1 2106 0          TCF    COMMEXIT

0107  REF   1                       20,2072  SETRATE  EQUALS HOLDRATE
```

```
L0010   DAP INTERFACE SUBROUTINES                                   USER'S OWN PAGE NO.  5          S3  E6

P0110   SUBROUTINE NAME: 1. UPCOAST     MOD. NO. 1  DATE: DECEMBER 4, 1966
R0111                    2. ALLCOAST
R0112                    3. WCHANGE

R0113   AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0114   "UPCOAST" SETS UP DAP VARIABLES TO THEIR ASCENT-COAST VALUES.

R0115   GROUNDRULE: IT MUST BE CALLED AS SOON AS ASCENT COAST IS DETECTED.

R0116   "ALLCOAST" SETS UP MANY DAP VARIABLES FOR "STARTDAP" IN "DAPIDLER".

R0117   GROUNDRULE: DESCOAST IS CALLED AS SOON AS DESCENT COAST IS DETECTED.

R0118   "WCHANGE" SETS UP THE VARIABLE FOR "WCHANGER" AS A STORAGE SAVING DEVICE.

R0120   CALLING SEQUENCE: (SAME AS ABOVE.)

R0121   SUBROUTINES CALLED: NONE.

R0122   ZERO: AOSQ,AOSR,AOSU,AOSV,AOSQTERM,AOSRTERM,ALL NJS.

R0123   SET JRGRATQ AND URGRATR TO POSMAX.

R0124   OUTPUT: WFORP  (1-K)   MINIMPDB  APSGOING/DAPBOOLS
R01245          WFORQR (1-C)/8  DBMINIMP  1/AMINQ  1/AMINR  1/AMINU  1/AMINV
R0125   DEBRIS: A,L.

R0126   ***** WARNING. *****  EBANK MUST BE SET TO 6.

 0127                                  20,2127                 BANK   20
 0128   REF   2 LAST  54                 E6                   EBANK= WFORP

 0134   REF   3 LAST 475      20,2127  3 5632 0  ALLCOAST  CAF    EBANK6
 0135   REF  28 LAST 475      20,2130  56 003 1             XCH    EBANK
 0136   REF   6 LAST  83      20,2131  54 066 0             TS     ITEMP6

 0137   REF   1               20,2132  4 7754 1             CS     APSGOING
 0138   REF  22 LAST 476      20,2133  7 0077 0             MASK   DAPBOOLS
 0139   REF  23 LAST 477      20,2134  54 077 0             TS     DAPBOOLS

 01395  REF   2 LAST  96      20,2135  3 7771 1             CAF    NEGONE      MAKES SPECIAL DAP APS CODING INACTIVE
 01396  REF   1               20,2136  55'732 1             TS     AOSCOUNT
 0140   REF   1               20,2137  3 3420 1             CAF    0.00444
 0141   REF   1               20,2140  55'631 0             TS     MINIMPDB    IMPULSE DBS ARE SET TO 0.8 DEGREES.
 01415  REF   1               20,2141  55'632 0             TS     DBMMPAX     (AND P-AXIS VALUE)
 0142   REF   2 LAST  54      20,2142  55'630 1             TS     DBMINIMP

 0143   REF  21 LAST 436      20,2143  3 7743 0             CAF    POSMAX      SET URGENCY FUNCTION CORRECTION RATIOS
 0144   REF   2 LAST  56      20,2144  55'725 1             TS     JRGRATQ     TO ALMOST 1 BEFORE BEING SET IN AOSJOB.
```

L0010 DAP INTERFACE SUBROUTINES USER'S OWN PAGE NO. 6 S3 E6

```
0145   REF   1              20,2145  55'726 1            TS      JRGRATR         SCALED AT 1.

01451  REF   1              20,2146  3 3744 0            CAF     ACCFIFTY        INVERSE MINIMUM ACCELERATIONS ARE SET TO
01452  REF   2 LAST  55     20,2147  55'721 0            TS      1/AMINQ         50 SECONDS(2)/RADIAN.  THESE VARIABLES
01453  REF   I              20,2150  55'722 0            TS      1/AMINR         ARE SET TO HALF THAT VALUE WITH THE
01454  REF   I              20,2151  55'723 1            TS      1/AMINU         SCALE FACTOR 2(+8)/PI.
01455  REF   1              20,2152  55'724 0            TS      1/AMINV

0146   REF   1              20,2153  3 2174 1            CAF     13DEC           ZERO THE FOLLOWING DAP ERASABLES:
0147   REF   1              20,2154  55'650 1  CLEARASC  TS      KCDEFCTR        AOSQ  AOSQTERM  NJ+Q  NJ+U
0148   REF 156 LAST 476     20,2155  3 7767 0            CAF     ZERO            AOSR  AOSRTERM  NJ-Q  NJ-U
0149   REF   2 LAST 478     20,2156  51'650 0            INDEX   KCDEFCTR        AOSU                NJ+R  NJ+V
0150   REF   5 LAST 336     20,2157  55'660 1            TS      AOSQ            AOSV                NJ-R  NJ-V
0151   REF   3 LAST 478     20,2160  11'650 1            CCS     KCDEFCTR
0152   REF   1              20,2161  1 2154 1            TCF     CLEARASC

0153   REF   1              20,2162  3 3423 1  WCHANGE   CAF     0.3125          K = 0.5
0154   REF   3 LAST 477     20,2163  55'640 0            TS      WFORP           WFORP = WFORQR = K/DT = K/.1 = 10< = 5
0155   REF   1              20,2164  55'641 1            TS      WFORQR          SCALED AT 16 PER SECOND.

0156                        20,2165  0 0006 1            EXTEND                  K = 0.5 IMPLIES (1-K) = 0.5:
0157   REF   1              20,2166  3 3434 1            DCA     (1-K)S          (1-K)   = 0.5   SINCE SCALED AT 1.
0158   REF   2 LAST  54     20,2167  53'643 0            DXCH    (1-K)           (1-K)/8 = 0.0625 SINCE SCALED AT 8.

R0159  *** NOTE THAT STARTDAP RESETS WFORP,WFORQR,(1-K),(1-K)/8. ***

0160   REF   7 LAST 477     20,2170  30 066 1            CAE     ITEMP6
01605  REF  29 LAST 477     20,2171  54 003 0            TS      EBANK

0161   REF 180 LAST 476     20,2172  0 0002 0            TC      Q               RETURN


0162                        20,2173   00033 1  0.3DEGDB  DEC     0.00167
0163                        20,2174   00015 0  13DEC     DEC     13
```

L0010 DAP INTERFACE SUBROUTINES USER'S OWN PAGE NO. 7 S3 E6

```
P01632  APS AND DPS ENGINE-ON ROUTINES (MUST BE CALLED WITH INTERRUPT INHIBIT)
R01633  THE NAMES ENGINEON, ENGINOFF, AND ENGINOF1 ARE PRESERVED TO KEEP CURRENT
R016335 SIMULATIONS AND EDITS OUT OF TROUBLE.

 01634  REF   4 LAST 477     20,2175  3 5632 0  APSENGON CAF    EBANK6
 0164   REF  30 LAST 478     20,2176  56 003 1         XCH    EBANK
 0165   REF   2 LAST 336     20,2177  55'312 1         TS     TEVENT +1

 0166   REF 157 LAST 478     20,2200  4 7767 1         CS     ZERO          DUMMYFIL WILL SET APSGOING BIT BECAUSE
 0167   REF   2 LAST 477     20,2201  55'732 1         TS     AOSCOUNT      OF MINUS ZERO IN AOSCOUNT
 0169   REF   1              20,2202  3 6106 0         CAF    PGNSCADR      ACTIVATE PGNCS MONITOR

R01692  START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*****************
 01696  REF   1              20,2203  1 3057 1  20INSRT  TCF    20INSRTA      STORE TIME FOR ENGINOFF DELAY LOGIC.
R01698  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****************
 017001 REF  24 LAST 477     20,2204  4 0077 0         CS     DAPBOOLS      TURN TRIM GIMBAL OFF IN CASE WE DID FITH
 017005 REF   2 LAST 215     20,2205  7 7762 1         MASK   JSERJTS
 017009 REF  25 LAST 479     20,2206  26 077 0         ADS    DAPBOOLS

 0171   REF   1              20,2207  4 2225 1         CS     INPARAB       MODIFY THE TJETLAW FOR ASCENT BURNS:
 0172   REF   2 LAST 477     20,2210  55'631 0         TS     MINIMPDB      (IN ONE EQUATION DELETE MINIMPDB AND
 0173   REF 158 LAST 479     20,2211  3 7767 0         CAF    ZERO          SHIFT THE SWITCHING CURVE TO THE ORIGIN)
 0174   REF   3 LAST 477     20,2212  55'630 1         TS     DBMINIMP      MINIMPDB = -DB, DBMINIMP = 0

 01821                       20,2213  0 0006 1         EXTEND               SET UP ASCENT URGENCY LIMITS SCALED AT
 01822  REF   1              20,2214  3 2312 0         DCA    ASCJRGLM      2(+9) SECONDS AND
 01823  REF   3 LAST  51     20,2215  53'477 0         DXCH   JRGLMS        2(+4) SECONDS.

 01824                       20,2216  0 0006 1         EXTEND               SET UP ASCENT RATE COMMAND VALUES:
 01825  REF   1              20,2217  3 2314 0         DCA    ASCRATEC      -2.0 DEGREES/SECOND SCALED AT PI/4 LIMIT
 01826  REF   2 LAST  51     20,2220  53'501 0         DXCH   -2JETLIM      -1.0 DEGREES/SECOND SCALED AT PI/4 DB

 01827  REF   1              20,2221  3 2224 1         CAF    -.06ACC       SET ACC. LIMIT FOR INVERSE CALCULATION
 018282 REF   1              20,2222  55'655 1         TS     -.06R/S2      HERE FOR STAGING AT APS BURN.
 0188   REF   1              20,2223  1 2235 0         TCF    ENGINEON      BYPASS THE SPECIAL DPS MONITOR SETUP

 01881                       20,2224   76615 1  -.06ACC  DEC    -.03820      -0.06 RADIANS/SECOND(2) AT PI/2

 01882                       20,2225   00067 0  INPARAB  DEC    +.00333      NOTE FOR AS206 USE -.6DB NOT -DB

 0189   REF  31 LAST 479     20,2226  3 0003 1  DPSENGON CA     EBANK        SAVE CALLER'S EBANK
 0190   REF   3 LAST 479     20,2227  55'312 1         TS     TEVENT +1
 0191   REF   1              20,2230  3 6105 0         CAF    GMBLMNAD      GIMBLMON HANDLES THE TRIM GIMBAL ON/OFF
A01911                                                                      LOGIC AND EXITS TO PGNCSMON

R01915  START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*****************

 0192   REF   1              20,2231  1 3767 0  INSERT20 TCF    SETCNTR       SET FLAGS FOR CRITICAL GTS ENTRIES.

R019206 **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****************
```

L0010 DAP INTERFACE SUBROUTINES USER'S OWN PAGE NO. 8 S3 E6

```
01921  REF  28 LAST 474     20,2232  4 7760 0          CS     BIT4          CLEAR GIMBLMON INHIBIT FLAG JUST IN CASE
01922  REF   8 LAST 326     20,2233  7 0076 1          MASK   FLAGWRD2      IT HAD NOT BEEN RESET BY THROTTLE CONTRO
01923  REF   9 LAST 480     20,2234  54 076 1          TS     FLAGWRD2

0193                        20,2235  0 0006 1  ENGINEON EXTEND
0194   REF  17 LAST 389     20,2236  3 0025 0          DCA    TIME2         THE ENGINE-ON COMMAND IS RECORDED
0195   REF   4 LAST 479     20,2237  53'312 1          DXCH   TEVENT        FOR THE DOWNLINK

01952  REF   2 LAST  88     20,2240  3 1340 1          CA     STOPDVC
01954  REF   1              20,2241  55'341 1          TS     SETDVCNT
0196   REF   1              20,2242  3 6107 1          CA     BURNDB        SET ONE DEGREE DEADBAND FOR THE BURN
0197   REF   3 LAST 475     20,2243  54 375 1          TS     DB

0198   REF   5 LAST 373     20,2244  4 5210 0          CS     PRIO30        TURN ON THE ENGINE - APS OR DPS
0199                        20,2245  0 0006 1          EXTEND               DEPENDING ON THE ARM COMMAND
0200                        20,2246  02 011 0          RAND   11
0201   REF  18 LAST 373     20,2247  6 7747 1          MP     BIT13
0202                        20,2250  0 0006 1          EXTEND
0203                        20,2251  01 011 0          WRITE  11

0204   REF  12 LAST 471     20,2252  4 0075 1          CS     FLAGWRD1      SET ENGINBIT - THE BIT WILL BE CLEARED
0205   REF   1              20,2253  7 7757 1          MASK   ENGINBIT      IN ENGINOFF AND THUS NODV CAN CHECK IT
0206   REF  13 LAST 480     20,2254  26 075 1          ADS    FLAGWRD1      TO ASCERTAIN NORMAL OR PREMATURE CUTOFF

02061  REF   3 LAST 466     20,2255  3 5661 0          CA     EBANK5
02062  REF  32 LAST 479     20,2256  54 003 0          TS     EBANK
020625 REF   6 LAST  69                 E5            EBANK= DVCNTR
02063  REF   2 LAST  88     20,2257  3 1337 1          CA     STARTDVC      SET UP THE DV MONITOR
02064  REF   7 LAST 480     20,2260  55'511 1          TS     DVCNTR
02065  REF  33 LAST 480     20,2261  22 003 1          LXCH   EBANK         RESTORE CALLER'S EBANK
0207   REF 181 LAST 478     20,2262  0 0002 0          TC     Q             RETURN TO CALLER
```

```
L0010   DAP INTERFACE SUBROUTINES                                   USER'S OWN PAGE NO.  9          S3  E5

P0208   APS AND DPS ENGINE - OFF ROUTINE ( CALL WITH INTERRUPT INHIBITED )

R02082  START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*****************
 0209   REF   1              20,2263  1 3064 1  ENGINOFF TCF    2DINCRTB       PROCEED TO ENGINOFF DELAY LOGIC.

R02095  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967****END CODING FOR MODULE  3 REMAKE, AUGUST 1967*****************
 02105  REF   1              20,2264  0 2127 1           TC     ALLCOAST       DO DAP COASTING FLIGHT INITIALIZATION.

 0211                        20,2265  0 0006 1           EXTEND
 0212   REF  18 LAST 480     20,2266  3 0025 0           DCA    TIME2          THE ENGINE - OFF COMMAND IS RECORDED
 0213   REF   5 LAST 480     20,2267  53'312 1          DXCH   TEVENT         FOR THE DOWNLINK

R0214   START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*****************
 02155                       20,2270  0 0006 1           EXTEND                 RESTORE ORIGINAL Q SETTING.
 0216   REF   1              20,2271  22 376 0           DXCH   /TEMP1/

R0217   **END CODING FOR MODULE 3 REMAKE, AUGUST 1967****END CODING FOR MODULE  3 REMAKE, AUGUST 1967*****************
 021702 REF  26 LAST 479     20,2272  4 0077 0           CS     DAPBOOLS       TURN TRIM GIMBAL OFF.
 021704 REF   3 LAST 479     20,2273  7 7762 1           MASK   USEDOTS
 021706 REF  27 LAST 481     20,2274  26 077 0           ADS    DAPBOOLS
 021708 REF   2 LAST 479     20,2275  3 6106 0           CAF    PGNSCADR       MAKE SURE GIMBLMON DOES NOT TURN GIMBAL
 021709 REF   5 LAST 338     20,2276  55'310 0          TS     DVSELECT       BACK ON.

 0218   REF   6 LAST 480     20,2277  4 5210 0  ENGINOF1 CS     PRIDAO         TURN OFF THE ENGINE
 0219                        20,2300  0 0006 1           EXTEND
 0220                        20,2301  02 011 0           RAND   11
 0221   REF  31 LAST 474     20,2302  6 7746 0           AD     BIT14
 0222                        20,2303  0 0006 1           EXTEND
 0223                        20,2304  01 011 0           WRITE  11

 02231  REF   2 LAST 480     20,2305  4 7757 1           CS     ENGINBIT       CLEAR ENGINBIT - THIS IS AN INDICATION
 02232  REF  14 LAST 480     20,2306  7 0075 1           MASK   FLAGWRD1       OF NORMAL SHUTDOWN
 02233  REF  15 LAST 481     20,2307  54 075 1           TS     FLAGWRD1

R0224   START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*****************

 02242  REF   1              20,2310  1 3045 1  INSRT20A TCF    RESETCTR       GO DEACTIVATE EXTRAORDINARY GTS FLAGS,

A02243                                                                      THEN RETURN TO CALLER.
R02244  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967****END CODING FOR MODULE  3 REMAKE, AUGUST 1967*****************

 0225   REF  22 LAST 474                 7757  ENGINBIT EQUALS BIT5
 0300                        20,2311  77767 1  ASCURGLM DEC    -0.25 B-9      -0.25 SECONDS SCALED AT 2(+9).
 0301                        20,2312  77377 1           DEC    -0.25 B-4      -0.25 SECONDS SCALED AT 2(+4).
 0302                        20,2313  77001 0  ASCRATEC OCTAL  77001          -1.4 DEG/SEC SCALED AT PI/4 RADIANS/SEC
 0303                        20,2314  77555 1           OCTAL  77555          -0.4 DEG/SEC SCALED AT PI/4 RADIANS/SEC

 0310   REF 182 LAST 480     20,2315  22 002 0  1STENGOF LXCH   Q              COME HERE FROM FRESH START.
 0311   REF   1              20,2316  0 2277 1           TC     ENGINOF1       JUST TURN OFF ENGINE
 0312   REF 183 LAST 481     20,2317  22 002 0           LXCH   Q
```

L0010 DAP INTERFACE SUBROUTINES USER'S OWN PAGE NO. 10 S3 E5

0313 REF 2 LAST 481 20,2320 1 2127 0 TCF ALLCOAST AND SET UP FOR COAST.

L T6-RUPT PROGRAMS USER'S OWN PAGE NO. 1 S3

R0001 PROGRAM NAMES: (1) DOT6RUPT MOD. NO. 4 DATE: FEBRUARY 9, 1967

R0002 (2) T6JOBCHK

R0003 MODIFICATION BY: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0004 THESE PROGRAMS ENABLE THE LM DAP TO CONTROL THE THRUST TIMES OF THE REACTION CONTROL SYSTEM JETS BY USING TIME6.
R0006 SINCE THE LM DAP MAINTAINS EXCLUSIVE CONTROL OVER TIME6 AND ITS INTERRUPTS, THE FOLLOWING CONVENTIONS HAVE BEEN
R0008 ESTABLISHED AND MUST NOT BE TAMPERED WITH:
R0009 1. NO NUMBER IS EVER PLACED INTO TIME6 EXCEPT BY LM DAP.
R0010 2. NO PROGRAM OTHER THAN LM DAP ENABLES THE TIME6 COUNTER.
R0011 3. ONLY POSITIVE NUMBERS ARE ENTERED INTO TIME6, SO IT COUNTS DOWN TO -0 (MINUS ZERO) TO INTERRUPT.
R0013 4. IF -0 IS NOT IN TIME6 WHEN THE INTERRUPT OCCURS, THEN THE INTERRUPT HAS ALREADY BEEN PROCESSED.
R0015 5. ALL PROGRAMS WHICH OPERATE IN EITHER INTERRUPT MODE OR WITH INTERRUPT INHIBITED MUST CALL T6JOBCHK
R0017 EVERY 6 MILLISECONDS TO PROCESS A POSSIBLE WAITING T6RUPT BEFORE IT CAN BE HONORED BY THE HARDWARE.

R0019 DOT6RUPT CALLING SEQUENCE:

```
R0020  REF   1              4004  52 011 0        DXCH   ARUPT          T6RUPT
R0022                       4005  0 0006 1        EXTEND
R0023  REF   1              4006  3 5045 0        DCA    T6ADR
R0024                       4007  52 006 0        DTCB
```

R0025 T6JOBCHK CALLING SEQUENCE:

```
R0026  REF   0          23,1000  0 4200 1        TC     T6JOBCHK
```

R0027 SUBROUTINES CALLED: DOT6RUPT CALLS T6JOBCHK.

R0028 NORMAL EXIT MODES: DOT6RUPT TRANSFERS CONTROL TO RESUME.
R0029 T6JOBCHK TRANSFERS CONTROL TO CALLER AT LOCATION AFTER CALL.

R0031 ALARM/ABORT MODES: NONE.

R0032 INPUT: TIME6,T6NEXT REGS,T6NEXTJT REGS.

R0033 OUTPUT: (SAME AS INPUT.)

R0034 DEBRIS: DOT6RUPT: NONE. T6JOBCHK: A,L

R0035 *** NOTE: AS OF MOD. NO. 2, T6NEXT AND T6NEXTJT LISTS ARE IN UNSWITCHED ERASABLE. ***

L T6-RUPT PROGRAMS USER'S OWN PAGE NO. 2 S3

```
0037                                    5050            BLOCK   02
0038    REF   1                           E2            EBANK=  T6NEXT

0039    REF   2 LAST 484                  E2            EBANK=  T6NEXT
0040                            5050    02000 0 T6ADR   2CADR   DOT6RUPT       2CADR OF INTERRUPT PROCESSOR.
C0040   REF   1                 5051    34062 1
0041                                    16,2000         BANK    16
0042    REF   3 LAST 484                  E2            EBANK=  T6NEXT

0043    REF   7 LAST 330        16,2000 22 016 0 DOT6RUPT XCH   BANKRUPT      (INTERRUPT LEAD IN CONTINUED)
0044                            16,2001 0 0006 1        EXTEND
0045    REF   7 LAST 330        16,2002 22 012 1        QXCH    QRUPT

0046    REF   1                 16,2003 0 6013 0        TC      T6JOBCHK       CALL T6JOBCHK

0047    REF  18 LAST 332        16,2004 1 5733 1        TCF     RESJME         END TIME6 RUPT


0048                                    6013            BLOCK   03
0049    REF   4 LAST 484                  E2            EBANK=  T6NEXT

0050    REF   1                 6013    10 031 1 T6JOBCHK CCS   TIME6         CHECK TIME6 FOR WAITING T6RUPT:
0051    REF 184 LAST 481        6014    0 0002 0        TC      Q              NONE: CLOCK COUTING DOWN.
0052    REF 185 LAST 484        6015    0 0002 0        TC      Q              NONE: T6RUPT ALREADY PROCESSED.
0053    REF 186 LAST 484        6016    0 0002 0        TC      Q              NONE: INVALID VALUE. (POSSIBLE ABORT.)

R0054   CONTROL PASSES TO T6JOB ONLY WHEN C(TIME6) = -0 (I.E. WHEN A T6RUPT MUST BE PROCESSED).

0056    REF  22 LAST 477        6017    3 7743 0 T6JOB  CAF     POSMAX         DISABLE CLOCK; NEEDED SINCE RUPT OCCURS
0057                            6020    0 0006 1        EXTEND                 1 DINC AFTER T6 = 77777.  FOR 625 MUSECS
0058                            6021    03 013 0        MASK    13             MUST NOT HAVE T6 = +0 WITH ENABLE SET.

0059    REF 159 LAST 479        6022    3 7767 0        CAF     ZERO           UPDATE ORDERED LIST OF T6NEXT REGISTERS
0060    REF   5 LAST 484        6023    57,003 0        XCH     T6NEXT +1      1) PUSH FIRST ENTRY INTO TIME6.
0061    REF   6 LAST 484        6024    57,002 1        XCH     T6NEXT         2) PUSH SECOND ENTRY INTO FIRST PLACE.
0062    REF   2 LAST 484        6025    54 031 1        TS      TIME6          3) ZERO LAST (SECOND) DT IN LIST.

0063    REF   3 LAST 484        6026    10 031 1        CCS     TIME6          TIME6 EITHER POSITIVE OR PLUS ZERO:
0064    REF   1                 6027    1 6032 1        TCF     T6NZERO        (BRANCH IF TIME6 STILL ACTIVE.)

0065    REF   1                 6030    31,004 1        CAE     T6NEXTJT       THESE ARE TRANSLATION JETS (NO DT).
0066    REF   1                 6031    1 6041 0        TCF     WRITEJTS       DETERMINE CHANNEL AND WRITE.

0067    REF  29 LAST 474        6032    3 7745 0 T6NZERO CAF    BIT15          ENABLE TIME6 COUNTER TO START TIMING
0068                            6033    0 0006 1        EXTEND                 THIS JET FIRING (PROPER JETS NOT YET
0069                            6034    05 013 0        MOR     13             WRITTEN INTO CHANNEL, BUT WILL BE SOON).

0070    REF 150 LAST 484        6035    3 7767 0        CAF     ZERO           UPDATE ORDERED LIST OF JET POLICIES:
0071    REF   2 LAST 484        6036    57,006 0        XCH     T6NEXTJT +2    1) LEAVE JETS TO GO ON NOW IN A.
```

L T6-RJPT PROGRAMS USER'S OWN PAGE NO. 3 S3 E2

```
0072  REF  3 LAST 484   6037  57*005 0   xCH  T6NEXTJT +1   2) CYCLE LIST UP TOWARD TOP.
0073  REF  4 LAST 485   6040  57*004 1   xCH  T6NEXTJT      3) ZERO LAST ENTRY IN LIST.
```

L T6-RUPT PROGRAMS USER'S OWN PAGE NO. 4 S3 E2

P0074 THE FOLLOWING JET-ON LOGIC MAY BE USED AS A SUBROUTINE (3 ENTRY POINTS):

R0075 FIRST, LET SGN(A) DETERMINE THE JET CHANNEL:
R0076 POSITIVE IMPLIES P-AXIS POLICY.
R0077 NEGATIVE IMPLIES Q,R-AXES POLICY.

```
0078                          6041  0 0006 1  WRITEJTS EXTEND                TEST FOR CHANNEL TO WRITE POLICY IN:
0079  REF  1                  6042  6 6046 0           BZMF    WRITEQR       NEG: Q,R-AXES JETS IN CHANNEL 5
```

R0080 SECOND, FOR P-AXIS JET POLICIES:

```
0081                          6043  0 0006 1  WRITEP   EXTEND                POS: P-AXIS   JETS IN CHANNEL 6
0082                          6044  01 006 0           WRITE   6
0083  REF 187 LAST 484        6045  0 0002 0           TC      Q             RETURN.
```

R0084 THIRD, FOR Q,R-AXES JET POLICIES:

```
0085                          6046  0 0006 1  WRITEQR  EXTEND                Q,R-AXES JETS IN CHANNEL 5
0086                          6047  01 005 0           WRITE   5
0087  REF 188 LAST 486        6050  0 0002 0           TC      Q             RETURN.
```

L DAPIDLER PROGRAM USER'S OWN PAGE NO. 1 53

R0001 THE DAPIDLER PROGRAM IS STARTED BY FRESH START AND RESTART. THE DAPIDLER PROGRAM IS DONE 10 TIMES
R0003 PER SECOND UNTIL THE ASTRONAUT DESIRES THE DAP TO WAKE UP, AND THE IMU AND CDUS ARE READY FOR USE BY THE DAP.
R0005 THE NECESSARY INITIALIZATION OF THE DAP IS DONE BY THE DAPIDLER PROGRAM.
R0006 ADDITIONAL WORK MUST BE DONE ON DAPIDLER IN THE FUTURE.

```
0007                                  16,2005          BANK   16
0008   REF   4 LAST 473                  E6           EBANK= DT

0009   REF  32 LAST 474   16,2005  3 7756 1  CHEKBITS CAF    BIT6
0010   REF  60 LAST 336   16,2006  7 0365 0          MASK   IMODES30
0011   REF 227 LAST 471   16,2007  10 000 0          CCS    A
0012   REF   1            16,2010  1 2166 0          TCF    MORETDLE

0013   REF  29 LAST 480   16,2011  3 7760 1          CAF    BIT4
0014   REF  23 LAST 481   16,2012  6 7757 0          AD     BIT5
0015                      16,2013  0 0006 1          EXTEND
0016                      16,2014  02 012 0          RAND   12
0017   REF 228 LAST 487   16,2015  10 000 0          CCS    A
0018   REF   2 LAST 487   16,2016  1 2166 0          TCF    MORETDLE

0019   REF  37 LAST 474   16,2017  3 7752 0          CAF    BIT10          BIT10 OF 30 IS PNGCS CONTROL OF S/C
0020                      16,2020  0 0006 1          EXTEND
0021                      16,2021  02 030 0          RAND   30             BITS IN 30 ARE INVERTED
0022   REF 229 LAST 487   16,2022  10 000 0          CCS    A
0023   REF   3 LAST 487   16,2023  1 2166 0          TCF    MORETDLE

0024                      16,2024  0 0006 1          EXTEND
0025                      16,2025  00 031 0          READ   31             IF BOTH   BIT13 AND BIT14 ARE ONE
0026                      16,2026  4 0000 0          COM                   THEN MODE SELECT SWITCH IS IN OFF
0027   REF   3 LAST 404   16,2027  7 5210 0          MASK   BIT13-14       POSITION.
0028                      16,2030  0 0006 1          EXTEND
0029   REF   4 LAST 487   16,2031  1 2166 0          BZF    MORETDLE       HENCE DAP SHOULD BE OFF.

0030   REF   3 LAST 338   16,2032  3 7751 0          CAF    GODAPGO
0031   REF  28 LAST 481   16,2033  7 0077 0          MASK   DAPBOOLS
0032                      16,2034  0 0006 1          EXTEND
0033   REF   5 LAST 487   16,2035  1 2166 0          BZF    MORETDLE

0034                      16,2036  0 0002 0          RETURN
```

L DAPIDLER PROGRAM USER'S OWN PAGE NO. 2 S3 E6

P0035 DAPIDLER ENTRY.

```
 0036   REF   8 LAST 484     16,2037  22 016 0  DAPIDLER LXCH   BANKRUPT        INTERRUPT LEAD INS (CONTINUED)
R003605 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************
 0037   REF   1               16,2040  1 3627 0           TCF    T5IDLERI
 0038   REF  13 LAST 436      16,2041  0 4736 1           TC     CCSHOLE

 003805 REF   1               16,2042  3 7761 0  DAPIDLEI CAF    DATAGOOD
R003808 **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

 00381  REF  29 LAST 487      16,2043  7 0077 0           MASK   DAP3BOLS
 003815                       16,2044  0 0006 1           EXTEND
 00382  REF   1               16,2045  1 2207 1           BZF    TESTMASS
 0039   REF   1               16,2046  0 2005 0           TC     CHECKBITS       CHECK TO SEE IF LM DAP IS TO GO ON.

 0051   REF  16 LAST 319      16,2047  0 5270 1  STARTDAP TC     IBNKCALL
 0052   REF   3 LAST 101      16,2050   40114 1           FCADR  STOPRATE
 0053   REF 161 LAST 484      16,2051  3 7767 0           CAF    ZERO            ********** INITIALIZE; **********
 0054   REF   4 LAST 484      16,2052  54 031 1           TS     TIME6           T6RUPT CLOCK
 0055   REF   2 LAST  53      16,2053  55'611 1           TS     TP              RATE DERIVATION DTS
 0056   REF   1               16,2054  55'612 1           TS     TQR
 00561  REF   1               16,2055  55'605 1           TS     JETRATEQ        Q,R JETRATES USED IN Q,R-AXES BEFORE
 00562  REF   1               16,2056  55'606 1           TS     JETRATER        BEING SET, GIVEN TQR ZERO.
 0057   REF   1               16,2057  55'463 0           TS     LASTDER         ATTITUDE ERROR RECORDS FOR EIGHTBALL.
 0058   REF   1               16,2060  55'464 1           TS     LASTQER
 0059   REF   1               16,2061  55'465 0           TS     LASTRER
 0060   REF   1               16,2062  55'466 0           TS     PERROR
 0061   REF   2 LAST  52      16,2063  55'467 1           TS     QERROR
 0062   REF   2 LAST  52      16,2064  55'470 1           TS     RERROR
 0063   REF   8 LAST 475      16,2065  55'415 1           TS     OMEGAP          RATES IN BODY (PILOT) COORDINATES.
 0064   REF   2 LAST  47      16,2066  55'416 1           TS     OMEGAQ
 0065   REF   5 LAST 475      16,2067  55'420 1           TS     OMEGAR
 0066   REF   7 LAST 484      16,2070  55'002 0           TS     T6NEXT          JTLST VARIABLES.
 0067   REF   8 LAST 488      16,2071  55'003 1           TS     T6NEXT +1
 0068   REF   1               16,2072  55'473 1           TS     ADDT6JTS
 0069   REF   1               16,2073  55'474 0           TS     ADDTLT6
 0070   REF   2 LAST  61      16,2074  55'007 0           TS     DELAYCTR        MINIMUM IMPULSE RHC MODE COUNTER.
 0071   REF   1               16,2075  55'417 0           TS     ALPHAQ          DESCENT ACCELERATION ESTIMATES.
 0072   REF   2 LAST 337      16,2076  55'421 0           TS     ALPHAR
 0073   REF   1               16,2077  55'515 0           TS     DISPLACT        EIGHTBALL ROUTINE SWITCH.
 0074   REF   3 LAST 478      16,2100  55'642 1           TS     (1-K)           K=1 FIRST PASS.

R00745 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

 0075   REF   1               16,2101  1 2455 0  INSRT16B TCF    PROTCTOR        RESTART PROTECT ENGINE-ON AND GIMBAL
A00755                                                                           DRIVE BITS.
R00756 **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

 0076   REF  22 LAST 474      16,2102  3 7762 0           CAF    BIT2            CHECK FOR STAGE
 007602                       16,2103  0 0006 1           EXTEND
```

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```
 007604                          16,2104  02 030 0          RAND    30
 007606                          16,2105  0 0006 1          EXTEND
 007607                          16,2106  1 2117 0          BZF     +9D             (BRANCH FOR ASCENT.)

 007608 REF 152 LAST 488         16,2107  3 7767 0          CAF     ZERO            1/ACCS BRANCHING VALUE IS ZERO FOR
 007609 REF   2 LAST 479         16,2110  55'655 1          TS      -.06R/S2        DESCENT LM DAP.

 00761                           16,2111  0 0006 1          EXTEND                  SET DESCENT URGENCY LIMIT = 1.5 SECONDS
 007612 REF   1                  16,2112  3 2251 0          DCA     JRGLMDWN        AS BOUND TO USE MAXIMUM JETS.
 007614 REF   4 LAST 479         16,2113  53'477 0          DXCH    JRGLMS
 007616                          16,2114  0 0006 1          EXTEND                  RATE ERROR LIMIT W/MIN JETS: 1.4 DEG/SEC
 007618 REF   1                  16,2115  3 2245 0          DCA     RCDMNDOWN       RATE ERROR DB    W/MIN JETS: 0.4 DEG/SEC
 007619                          16,2116  1 2126 1          TCF     +8D

 00762  REF   1                  16,2117  3 2254 0  +9D     CAF     ACCLIMIT        1/ACCS BRANCHING VALUE MUST BE
 007621 REF   3 LAST 489         16,2120  55'655 1          TS      -.06R/S2        0.06 RADIANS/SECOND(2) FOR ASCENT DAP.

 007622                          16,2121  0 0006 1          EXTEND                  SET ASCENT URGENCY LIMIT = .25 SECONDS
 007624 REF   1                  16,2122  3 2253 1          DCA     JRGLMUP         AS BOUND TO USE MAXIMUM JETS.
 007626 REF   5 LAST 489         16,2123  53'477 0          DXCH    JRGLMS
 007629                          16,2124  0 0006 1          EXTEND                  RATE ERROR LIMIT W/MIN JETS: 2.0 DEG/SEC
 00763  REF   1                  16,2125  3 2247 1          DCA     RCDMNDUP        RATE ERROR DB    W/MIN JETS: 1.0 DEG/SEC
 007632 REF   3 LAST 479         16,2126  53'501 0  +8D     DXCH    -2JETLIM

R0078   SET UP "OLD" MEASURED CDU ANGLES:

 0079                            16,2127  0 0006 1          EXTEND
 0080   REF  27 LAST 476         16,2130  3 0033 1          DCA     CDUX            OLDXFORP AND OLDYFORP
 0081   REF   4 LAST  49         16,2131  53'426 1          DXCH    OLDXFORP
 0082                            16,2132  0 0006 1          EXTEND
 0083   REF  15 LAST 475         16,2133  3 0034 0          DCA     CDUY            OLDYFORQ AND OLDZFORQ
 0084   REF   1                  16,2134  53'430 0          DXCH    OLDYFORQ

 0085   REF   1                  16,2135  3 2230 1          CAF     0.62170
 0086   REF   1                  16,2136  55'455 0          TS      4JETTORK
 0087   REF   1                  16,2137  3 2231 0          CAF     .68387          2200 FT LBS. SCALED AT 2(10) X PI.
 0088   REF   1                  16,2140  55'456 0          TS      JETTORK4        OR AXIS JET TORQUE FOR 4 JETS.
R0089   SET UP THE TORQUE VECTOR RECONSTRUCTION SWITCHES:

 0090                            16,2141  0 0006 1          EXTEND
 0091   REF   1                  16,2142  3 2241 1          DCA     VISNORMQ        PJUMPADR AND QJUMPADR
 0092   REF   2 LAST  54         16,2143  53'653 1          DXCH    PJUMPADR

R00921  SET SWITCH TO SKIP Q-RHTJETLAW SQUARE ROOT:

R0093   SET UP INITIAL VALUES FOR WFORP AND WFORQR:

 0094                            16,2144  0 0006 1          EXTEND                  SCALED AT 16:
 0095   REF   1                  16,2145  3 2243 0          DCA     WFORPQRK        WFORP  = K/DT = K/.1  = 1/.1  = 0.625
 0096   REF   4 LAST 478         16,2146  53'641 1          DXCH    WFORP           WFORQR = K/DT = K/.15 = 1/.15 = 0.41667
```

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R0097 SET UP WAITLIST CALL TO RESET WFORP AND WFORQR:

```
 0098   REF   1                 16,2147  3 2236 1            CAF     180MS
 0099   REF  69 LAST 472        16,2150  0 5663 1            TC      WAITLIST
 0100   REF   2 LAST 478                    E6               EBANK=  WFORQR
 0101                          16,2151    03435 0            2CADR   WCHANGER
C0101   REF   1                 16,2152    40066 0
 0150                          16,2153  0 0006 1            EXTEND                  SET UP P-AXIS TO GO TO DUMMYFIL
 0151   REF   1                 16,2154  3 2225 0            DCA     DF2CADR
 0152   REF   1                 16,2155  53,573 0            DXCH    PFILTADR

 0153                          16,2156  0 0006 1            EXTEND
 0154   REF   1                 16,2157  3 2223 0            DCA     PAXADIDL
 0155   REF   4 LAST  93        16,2160  53,001 0            DXCH    T5ADR
 0156   REF   1                 16,2161  3 2226 0  SETTIME5  CAF     MS100
 0157   REF   2 LAST  96        16,2162  54 030 0            TS      TIME5
 0158   REF  19 LAST 484        16,2163  1 5733 1            TCF     RESJME
 0159   REF   5 LAST 487                    E6               EBANK=  DT
 0160                          16,2164    02037 1  IDLERADR 2CADR   DAPIDLER
C0160   REF   2 LAST  99        16,2165    34066 0
 0161   REF   2 LAST 490        16,2166  4 2222 0  MOREIDLE  CS      PAXADIDL        DAP SHOULD BE OFF
016105  REF   5 LAST 490        16,2167  6 1000 0            AD      T5ADR
 01611                         16,2170  0 0006 1            EXTEND
016115  REF   1                 16,2171  1 2176 1            BZF     SHUTDOWN        CHECK TO SEE WHETHER THIS IS FROM P-AXIS

 01612                         16,2172  0 0006 1  SETT5ADR  EXTEND
016125  REF   1                 16,2173  3 2165 1            DCA     IDLERADR
 01613  REF   6 LAST 490        16,2174  53,001 0            DXCH    T5ADR
016135  REF   1                 16,2175  1 2161 1            TCF     SETTIME5

 0164   REF 153 LAST 489        16,2176  3 7767 0  SHUTDOWN  CAF     ZERO            COMMAND JETS OFF
 0165                          16,2177  0 0006 1            EXTEND
 0166                          16,2200  01 005 0            WRITE   5
 0167                          16,2201  0 0006 1            EXTEND
 0168                          16,2202  01 006 0            WRITE   6

 0169   REF   1                 16,2203  4 2220 1            CS      BGIM63          TURN TRIM GIMBAL OFF
 0170                          16,2204  0 0006 1            EXTEND
 0171                          16,2205  03 012 1            WAND    12

 0172   REF   1                 16,2206  1 2172 0            TCF     SETT5ADR
017205  REF   1                 16,2207  3 7750 1  TESTMASS  CAF     MASSGOOD
 01721  REF  30 LAST 488        16,2210  7 0077 0            MASK    DAPBOOLS
017215                         16,2211  0 0006 1            EXTEND
 01722  REF   6 LAST 487        16,2212  1 2166 0            BZF     MOREIDLE

017225  REF   2 LAST  96        16,2213  3 5655 1            CAF     PRIO34
 01723  REF  16 LAST 375        16,2214  0 5505 1            TC      NOVAC
017235  REF   6 LAST 490                    E6               EBANK=  DT
 01724                         16,2215    02713 0            2BCADR  1/ACCS
C01724  REF   1                 16,2216    54066 0
```

. L DAPIDLER PROGRAM USER'S OWN PAGE NO. 5 S3 E6

```
 017245 REF  2 LAST 490   16,2217  1 2172 0            ICF     SETI5ADR
 0173                     16,2220  07400  1  BSIM23    OCTAL   07400      
 0174                     16,2221  26501  1  .707P     DEC     .70711     SQUARE ROOT OF 1/2
 0175 REF  9 LAST 488                E6               EBANK=  OMEGAP
 0176                     16,2222  02255  1  PAXADIDL  2CADR   PAXIS
C0176 REF  1              16,2223  34066  0
 0177 REF  2 LAST 488                E6               EBANK=  ALPHAQ
 0178                     16,2224  03642  1  DF2CADR   2CADR   DUMMYFIL
C0178 REF  1              16,2225  34066  0
 0179                     16,2226  37766  1  MS100     OCTAL   37766      
 0180                     16,2227  00033  1  0.00167   DEC     0.00167    
 0181                     16,2230  23712  1  0.62170   DEC     0.62170    
 0182                     16,2231  25705  1  .68387    DEC     0.68387    
 0183                     16,2232  12000  1  0.31250   DEC     0.31250    

 0184                     16,2233  02215  0  DELTADOT  DEC     0.07111    0.2 DEG/SEC SCALED AT PI/64
 0186                     16,2234  11643  0  .5ACCMIN  DEC     0.30680    
 0187                     16,2235  00033  1  D3MNMP    DEC     0.00167    .3 DEGREES SCALED AT PI RADIANS
R0188 TORQUE AND WEIGHTING CONSTANTS:

 0189                     16,2236  00022  1  180MS     DEC     18         180 MS WAITLIST DT.
 0190                     16,2237  02315  1  .075DEC   DEC     0.075      100 MS JET PULSE TORQUE TERM WITH K = .5
 0191 REF  1              16,2240  02404  0  VISNORMQ  GENADR  CHKVTSFZ   D.P. GENADR FOR INITIALIZATION OF THE
 0192 REF  1              16,2241  02106  1            GENADR  NORMALQ    TORQUE VECTOR RECONSTRUCTION SWITCHES.
 0193                     16,2242  24000  1  10AT16    DEC     0.625      INITIAL VALUE FOR WFORP.
 0194                     16,2243  15253  1  6.6AT16   DEC     0.41667    INITIAL VALUE FOR WFORQR.
 0195 REF  1                       16,2242  WFORPQRK  EQUALS  10AT16     D.P. NAME FOR BOTH CONSTANTS


 0200                     16,2244  77001  0  RCOMDOWN  OCTAL   77001      -1.4 DEG/SEC SCALED AT PI/4 RADIANS/SEC.
 0201                     16,2245  77555  1            OCTAL   77555      -0.4 DEG/SEC SCALED AT PI/4 RADIANS/SEC.
 0202                     16,2246  76447  1  RCOMNDJP  OCTAL   76447      -2.0 DEG/SEC SCALED AT PI/4 RADIANS/SEC.
 0203                     16,2247  77223  1            OCTAL   77223      -1.0 DEG/SEC SCALED AT PI/4 RADIANS/SEC.
 0204                     16,2250  77717  0  JRGLMDWN  DEC     -.00293    -1.5 SECONDS SCALED AT 2(+9).
 0205                     16,2251  74777  0            DEC     -.09375    -1.5 SECONDS SCALED AT 2(+4).
 0206                     16,2252  77767  1  JRGLMUP   DEC     -0.25 B-9  -0.25 SECONDS SCALED AT 2(+9).
 0207                     16,2253  77377  1            DEC     -0.25 B-4  -0.25 SECONDS SCALED AT 2(+4).
 0208                     16,2254  76615  1  ACCLIMIT  DEC     -.03820    -.06 RADIANS/SECOND(2) SCALED AT PI/2.
```

L P-AXIS REACTION CONTROL SYSTEM AUTOPILOT USER'S OWN PAGE NO. 1 S3

```
 0001                                16,2255          BANK   16
 0002   REF   7 LAST 490                E6           EBANK= DT

R0003  THE FOLLOWING T5RUPT ENTRY BEGINS THE PROGRAM WHICH CONTROLS THE P-AXIS ACTION OF THE LEM USING THE RCS JETS.
R0005  THE NOMINAL TIME BETWEEN THE P-AXIS RUPTS IS 100 MS IN ALL NON-IDLING MODES OF THE DAP.

 0007   REF   1            16,2255  3 3754 1  PAXIS   CAF    TWENTYMS      RESET TIMER IMMEDIATELY - DT= 25 MS
 0008   REF   3 LAST 490   16,2256  54 030 0          TS     TIME5
 0009   REF   9 LAST 488   16,2257  22 016 0          LXCH   BANKRUPT      INTERRUPT LEAD IN (CONTINUED)
 0010                      16,2260  0 0006 1          EXTEND
 0011   REF   8 LAST 484   16,2261  22 012 1          QXCH   QRUPT

R0012  CHECK TO SEE IF DAP IS STILL IN USE:

 0013   REF   2 LAST 488   16,2262  0 2005 0          TC     CHECKBITS     RETURN IS TO I+1 IF DAP SHOULD STAY ON.

R0014  WHILE DAP IS ON, SET UP EITHER A KALMAN FILTER RUPT OR A DUMMY FILTER RUPT BY SETTING UP T5ADR FROM ERASABLE.

 0016                      16,2263  0 0006 1          EXTEND               T5ADR IS SET TO EITHER FILTER OR
 0017   REF   2 LAST 490   16,2264  3 1573 1          DCA    PFILTADR      DUMMYFIL IN A BLIND MANNER SINCE
A001705                                               PFILTADR IS SET UP ELSEWHERE

R00171 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

 00172  REF   1            16,2265  1 2406 0  INSRT16A TCF    PAXISCNT      GO DECREMENT COUNTERS.

R001799 **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

R001802 ***** KALCMANU-DAP AND "RATE-HOLD"-DAP INTERFACE *****

R001804 THE FOLLOWING SECTION IS EXECUTED EVERY 100 MS (10 TIMES A SECOND) WITHIN THE P-AXIS REACTION CONTROL SYSTEM
R001808 AUTOPILOT (WHENEVER THE DAP IS IN OPERATION).

 00181  REF  56 LAST 464   16,2266  3 7762 0          CAF    TWO           SET UP LOOP TO DO Z,Y,X CDU AXES:
001812  REF   1            16,2267  54 066 0  KALCLOOP TS    QRCNTR
 001814 REF   2 LAST 492   16,2270  50 066 1          INDEX  QRCNTR        KALCMANU AND RATE-HOLD USE THIS SECTI
 001816 REF   6 LAST 476   16,2271  30 766 0          CAE    CDUXD         TO PERFORM THEIR INDEPENDENT FUNCTION
 001818                    16,2272  0 0006 1          EXTEND               BOTH PROCEDURES SET UP THE DELCDU'S
 00182  REF   3 LAST 492   16,2273  5 0066 1          INDEX  QRCNTR        TO HAVE THE NEGATIVE VALUE OF THE
 001822 REF   5 LAST 476   16,2274  20 771 1          MSU    DELCDUX       DESIRED CDU CHANGE FOR EACH 100 MS CS
 001824 REF 230 LAST 487   16,2275  10 000 0          CCS    A             DURING THE MANEUVER (OR MODE).  EACH
 001826 REF 121 LAST 471   16,2276  6 7763 1          AD     ONE           STORED AT PI RADIANS IN 2'S COMPLEMEN
 001828                    16,2277  1 2301 0          TCF    +2            SINCE THE MODULAR SUBTRACT YIELDS THE
 00183                     16,2300  4 0000 0          COM                  NEW CDUD VALUE IN 1'S COMPLEMENT, THE
 001832 REF   4 LAST 492   16,2301  50 066 1          INDEX  QRCNTR        CCS SECTION IS NEEDED FOR 1'S TO 2'S
 001834 REF   7 LAST 492   16,2302  54 766 1          TS     CDUXD         CONVERSION OF DESIRED CDU ANGLES.

 001836 REF   5 LAST 492   16,2303  10 066 0          CCS    QRCNTR        (THIS MAKES THE LOOP DO ALL THREE
```

L P-AXIS REACTION CONTROL SYSTEM AUTOPILOT USER'S OWN PAGE NO. 2 S3 E6

```
001838 REF   1          16,2304  1 2267 1          TCF    CALCLOOP       AXES.  A = QRCNTR, DO NEXT DELCOU.
R0019  DO P AXIS RATE DERIVATION AND CONTROL LAW.
R0020  DERIVE DELTA P.

0021   REF 154 LAST 490 16,2305  3 7767 0          CA     ZERO
0022   REF  58 LAST 365 16,2306  54 061 1          TS     ITEMP1
0023   REF   3 LAST 488 16,2307  31,611 0          CAE    TP
0024   REF   1          16,2310  6 3566 1          AD     NEGCSP1
0025                    16,2311  0 0006 1          EXTEND
0026   REF   1          16,2312  6 2316 1          BZMF   DOTORQUE
0027   REF  59 LAST 493 16,2313  54 061 1          TS     ITEMP1
0028   REF   1          16,2314  3 3603 1          CA     CSPAT1P
0029   REF   1          16,2315  1 2324 1          TCF    SCALEDTP
0030   REF   4 LAST 493 16,2316  3 1611 0  DOTORQJE CA     TP
0031                    16,2317  0 0006 1          EXTEND
0032   REF  24 LAST 487 16,2320  7 7757 1          MP     BIT5
0033   REF  88 LAST 466 16,2321  30 001 0          CAE    L
0034                    16,2322  0 0006 1          EXTEND
0035   REF   1          16,2323  7 3571 0          MP     16/28
0036   REF   5 LAST 493 16,2324  55,611 1  SCALEDTP TS     TP
0037                    16,2325  0 0006 1          EXTEND
0038   REF   5 LAST 489 16,2326  7 1640 0          MP     WFORP
0039   REF   1          16,2327  6 1643 1          AD     (1-K)/8
0040                    16,2330  0 0006 1          EXTEND
0041   REF   6 LAST 493 16,2331  7 1611 1          MP     TP
0042                    16,2332  0 0006 1          EXTEND
0043   REF  30 LAST 487 16,2333  7 7760 0          MP     BIT4
0044   REF   5 LAST  54 16,2334  3 1613 1          CA     1JACC
0045                    16,2335  0 0006 1          EXTEND
0046   REF  89 LAST 493 16,2336  7 0001 1          MP     L
0047                    16,2337  0 0006 1          EXTEND
0048   REF   1          16,2340  7 1657 0          MP     NO.PJETS
0049   REF   3 LAST  53 16,2341  23,604 1          LXCH   JETRATE
0050   REF  50 LAST 493 16,2342  3 0061 0          CA     ITEMP1
0051   REF   7 LAST 493 16,2343  55,611 1          TS     TP

0052   REF  28 LAST 489 16,2344  30 032 0          CAE    CDJX
0053   REF  90 LAST 493 16,2345  54 001 1          TS     L
0054                    16,2346  0 0006 1          EXTEND
0055   REF   5 LAST 489 16,2347  21,425 1          MSU    OLDXFORP       SCALED AT PI
0056   REF   6 LAST 493 16,2350  23,425 0          LXCH   OLDXFORP
0057                    16,2351  22 007 0          ZL
0058   REF   1          16,2352  52 063 0          DXCH   DELTAP
00591  REF   8 LAST 474 16,2353  3 7753 1          CAF    BIT9
00592  REF 189 LAST 486 16,2354  54 002 1          TS     Q
0060   REF  16 LAST 489 16,2355  3 0033 1          CA     CDJY
0061   REF  91 LAST 493 16,2356  54 001 1          TS     L
0062                    16,2357  0 0006 1          EXTEND
0063   REF   1          16,2360  21,426 1          MSU    OLDYFORP       SCALED AT PI
0064   REF   2 LAST 493 16,2361  23,426 0          LXCH   OLDYFORP
```

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0065                          16,2362  0 0006 1          EXTEND
0066   REF  13 LAST 136       16,2363  7 1404 1          MP      M11          M11 SCALED AT 1
0067   REF   2 LAST 493       16,2364 20 063 0          DAS     DELTAP
00674                         16,2365  0 0006 1          EXTEND
00675  REF   3 LAST 494       16,2366  3 0063 1          DCA     DELTAP
0068                          16,2367  0 0006 1          EXTEND
0069   REF 130 LAST 493       16,2370 10 002 1          DV      Q            NOW SCALED AT PI/64
0071                          16,2371  0 0006 1          EXTEND
0072   REF   6 LAST 493       16,2372  7 1640 0          MP      WFORP        SCALED AT 2(4)=16, RESULT IN A AT PI/4.
0073   REF  10 LAST 491       16,2373 57'415 0          XCH     OMEGAP       W*DELTAP IN OMEGAP LOC, OLD OMEGAP IN A.
0074                          16,2374  0 0006 1          EXTEND
0075   REF   4 LAST 488       16,2375  7 1642 1          MP      (1-K)        SCALED AT 1
0076   REF   4 LAST 493       16,2376  6 1604 1          AD      JETRATE      RATE DUE TO JETS TORQUING.
0077   REF  11 LAST 494       16,2377 27'415 1          ADS     OMEGAP       PRATE= WFORP*DELTAP+ALPHA*LAST-PRATE+TPF
0078   REF   3 LAST 489       16,2400  0 1652 1  PAXFILT TC      PJUMPADR
0079   REF   2 LAST 489       16,2401  3 2240 0  SKIPPAXS CAF     VISNORMQ
0080   REF   4 LAST 494       16,2402 55'652 0          TS      PJUMPADR
0081   REF  20 LAST 490       16,2403  1 5733 1          TCF     RESJME

0082   REF   2 LAST 484       16,2404  0 6013 0  CHKVISFZ TC     T6JOBCHK     CHECK FOR T6 RUPT.

0083   REF   1                16,2405  1 2777 0          TCF     PURGENCY     NO RHC INPUTS ON 2CS

R00835 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

R00837 FROM P-AXIS-
R00838   1. COUNT DOWN GIMBAL DRIVE TIMES.
R00839   2. END DRIVES WHEN APPROPRIATE.
R00839  3. COUNT DOWN TIME FOR FORCED GTS JUST BEFORE THROTTLE-UP.

0084   REF   7 LAST 490       16,2406 53'001 0  PAXISCNT DXCH    T5ADR        (PRESERVE OLD CODING)

00841  REF   1                16,2407 11'764 1          CCS     SIMPCNTR     COUNT DOWN SIMPCNTR TO +0.  DECISECONDS
00842  REF   2 LAST 494       16,2410 55'764 1          TS      SIMPCNTR

0085   REF   3 LAST 366       16,2411 11'753 0          CCS     QGIMTIMR     Q-AXIS GIMBAL DRIVE TIMER-
0086   REF   1                16,2412  1 2427 0          TCF     DECQTIMR       POSITIVE- COUNTING DOWN
0087   REF   1                16,2413  1 2433 0          TCF     TURNOFFQ       POS ZERO- DRIVE SHOULD BE ENDED
0088   REF   3 LAST 366       16,2414 11'754 1  CHKRTIMR CCS     RGIMTIMR       NEGATIVE- INACTIVE
0089   REF   1                16,2415  1 2431 1          TCF     DECRTIMR       NEG ZERO- IMPOSSIBLE
0090   REF   1                16,2416  1 2443 1          TCF     TURNOFFR     REPEATED FOR R-AXIS (ABOVE).

0091   REF   1                16,2417 11'744 0  CNTRMCTR CCS     TRIMCNTR     COUNT DOWN FOR FORCED GTS ENTRY-
0092                          16,2420  1 2424 0          TCF     +4             POSITIVE- COUNTING DOWN
0093   REF  14 LAST 488       16,2421  0 4736 1          TC      CCSHOLE        POS ZERO- IMPOSSIBLE
0094   REF   1                16,2422  1 2566 1          TCF     CHKSMART       NEGATIVE- INACTIVE- RETURN
0095   REF   2 LAST 494       16,2423  1 2566 1          TCF     CHKSMART       NEG ZERO- THIS VALUE UNTIL DRIVE DONE.
0096   REF   3 LAST 477       16,2424  3 7771 1          CAF     NEGONE
0097   REF   2 LAST 494       16,2425 27'744 0          ADS     TRIMCNTR     COUNT TRIMCNTR DOWN TO NEG ZERO.
0098   REF   3 LAST 494       16,2426  1 2566 1          TCF     CHKSMART
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 0099   REF   4 LAST 494    16,2427  55'753 0  DECQTIMR TS    QGIMTIMR      COUNT QGIMTIMR DOWN TO POS ZERO.
 0100   REF   1            16,2430  1 2414 0            TCF   CHKRTIMR
 0101   REF   4 LAST 494    16,2431  55'754 1  DECRTIMR TS    RGIMTIMR      COUNT RGIMTIMR DOWN TO POS ZERO.
 0102   REF   1            16,2432  1 2417 0            TCF   CKTRMCTR

 0103   REF   2 LAST  52    16,2433  55'523 0  TJRNOFFQ TS    NEGJQ         REWRITE GIMBAL-DRIVE BITS TO HALT Q.
 01035  REF   1            16,2434  55'533 1            TS    QACCDOT
 0104   REF   1            16,2435  4 2453 0            CS    QGIMBITS
 0105                      16,2436  0 0006 1            EXTEND
 0106                      16,2437  03 012 1            MASK  12
 01065  REF   3 LAST 464    16,2440  3 7745 0            CAF   NEGMAX
 0107   REF   5 LAST 495    16,2441  55'753 0            TS    QGIMTIMR      DEACTIVATE TIMER.
 0108   REF   2 LAST 495    16,2442  1 2414 0            TCF   CHKRTIMR
 0109   REF   1            16,2443  55'525 0  TJRNOFFR TS    NEGJR         REWRITE GIMBAL DRIVE BITS TO HALT R.
 01095  REF   1            16,2444  55'535 1            TS    RACCDOT
 0110   REF   1            16,2445  4 2454 1            CS    RGIMBITS
 0111                      16,2446  0 0006 1            EXTEND
 0112                      16,2447  03 012 1            MASK  12
 01125  REF   4 LAST 495    16,2450  3 7745 0            CAF   NEGMAX
 0113   REF   5 LAST 495    16,2451  55'754 1            TS    RGIMTIMR      DEACTIVATE TIMER.
 0114   REF   2 LAST 495    16,2452  1 2417 0            TCF   CKTRMCTR
 011402                    16,2453  01400 1  QGIMBITS OCTAL 01400
 011404                    16,2454  06000 1  RGIMBITS OCTAL 06000

R01141 FROM STARTDAP- RESTART PROTECT THE CHANNEL 11 ENGINE-ON BIT AND THE CHANNEL 12 GIMBAL-DRIVE BITS.

 0115   REF   2 LAST 493    16,2455  55'643 0  PROTCTOR TS    (1-C)/8         (OLD CODING)

 0116   REF  16 LAST 481    16,2456  30 075 0            CAE   FLAGWRD1
 0117   REF   3 LAST 481    16,2457  7 7757 1            MASK  ENGINBIT
 0118                      16,2460  0 0006 1            EXTEND
 0119   REF   1            16,2461  1 2102 1            BZF   INSRT16B +1     RETURN TO STARTDAP IF ENGINE SHOULD BE
A0120                                                                          OFF.
 0121   REF  19 LAST 480    16,2462  3 7747 1            CAF   BIT13           OTHERWISE-
 0122                      16,2463  0 0006 1            EXTEND
 0123                      16,2464  05 011 1            MOR   11              RESET ENGINE-ON BIT.
 0124   REF   6 LAST 495    16,2465  4 1753 0            CS    QGIMTIMR
 0125                      16,2466  0 0006 1            EXTEND
 0126                      16,2467  6 2472 1            BZMF  +3              BRANCH IF Q-DRIVE TIMER ACTIVE.
 0127   REF 155 LAST 493    16,2470  3 7767 0            CAF   ZERO           OTHERWISE ZERO NEGUQ.
 0128   REF   3 LAST 495    16,2471  55'523 0            TS    NEGJQ
 0129   REF   6 LAST 495    16,2472  4 1754 1            CS    RGIMTIMR        REPEAT FOR R-DRIVE.
 0130                      16,2473  0 0006 1            EXTEND
 0131                      16,2474  6 2477 1            BZMF  +3
 0132   REF 156 LAST 495    16,2475  3 7767 0            CAF   ZERO
 01321  REF   2 LAST 495    16,2476  55'525 0            TS    NEGJR
 01322  REF  17 LAST 488    16,2477  0 5270 1            TC    IBNKCALL        SET UP DRIVES ACCORDING TO NEGJS.
 01323  REF   1            16,2500   43243 0            FCADR WRCHN12
 01324  REF   2 LAST 495    16,2501  1 2102 1            TCF   INSRT16B +1     RETURN TO OLD CODING.
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```
0133   REF   3 LAST 475     16,2502  3 7756 1  NODAPNO  CAF    ULLAGER
0134   REF  31 LAST 490     16,2503  7 0077 0           MASK   DAPBOOLS
0135                        16,2504  0 0006 1           EXTEND
0136   REF   1              16,2505  1 2521 1           BZF    ZEROFIVE
0137   REF   4 LAST 452     16,2506  4 0764 0           CS     PHASENUM      ULLAGE BIT IS SET,PROTECT MP7 +X COMMAND
0138   REF  10 LAST 444     16,2507  6 7765 1           AD     SEVEN
0139                        16,2510  0 0006 1           EXTEND
0140   REF   1              16,2511  1 2513 0           BZF    PROTCT+X
0141   REF   1              16,2512  1 2516 0           TCF    LEAVASIS      THIS IS NOT MP7, THIS IS NOT COLD PURGE.
0142   REF   1              16,2513  3 2523 1  PROTCT+X CAF    +XJETS
0143                        16,2514  0 0006 1  TWINEXIT EXTEND
0144                        16,2515  01 005 0           WRITE  5

0145   REF   1              16,2516  3 3567 0  LEAVASIS CAF    MS30P
0146   REF   4 LAST 492     16,2517  54 030 0           TS     TIME5
0147   REF  21 LAST 494     16,2520  1 5733 1           TCF    RESUME

0149   REF 157 LAST 495     16,2521  3 7767 0  ZEROFIVE CAF    ZERO
0150   REF   1              16,2522  1 2514 1           TCF    TWINEXIT

0152                        16,2523   00252 1  +XJETS   OCT    00252

0163                        16,2524  0 0006 1  ADDLT5ID EXTEND                (ARRIVE WITH BIT 11 IN A, FROM T5IDLER1)
0164   REF  13 LAST 311     16,2525  02 011 0           RAND   DSALMOUT
0165   REF 231 LAST 492     16,2526  10 000 0           CCS    A
0166   REF   1              16,2527  1 2544 1           TCF    MORET5ID      SMARTJOB IS ALREADY RUNNING.  NO ACTION.

0167   REF   3 LAST 295     16,2530  11'355 1           CCS    SMODE         NOT RUNNING.  SEE IF SELFCHECK WANTED.
0168   REF   2 LAST 496     16,2531  1 2544 1           TCF    MORET5ID      SELFCHECK IS ON, SO DON'T RUN SMARTJOB.
0169   REF   1              16,2532  1 2535 1           TCF    GETSMART      SELFCHECK IS OFF, SO START SMARTJOB.
0170   REF   3 LAST 496     16,2533  1 2544 1           TCF    MORET5ID      SELFCHECK IS ON, SO DON'T RUN SMARTJOB.
01705  REF   4 LAST 496     16,2534  1 2544 1           TCF    MORET5ID      SELFCHECK IS ON, SO DON'T RUN SMARTJOB.

0171   REF   1              16,2535  3 7752 0  GETSMART CAF    PRIO1
0172   REF  17 LAST 490     16,2536  0 5505 1           TC     NOVAC
0173   REF   1                             E0           EBANK= SMARTFLG
0174                        16,2537   02551 1           2CADR  SMARTJOB
C0174  REF   1              16,2540   34060 0
0175   REF  24 LAST 474     16,2541  3 7751 0           CAF    BIT11         SET THE SMARTJOB-RUNNING FLAG.
0176                        16,2542  0 0006 1           EXTEND
0177   REF  14 LAST 496     16,2543  05 011 1           WOR    DSALMOUT

0178   REF   4 LAST 487     16,2544  3 7751 0  MORET5ID CAF    GODAPGO
0179   REF  32 LAST 496     16,2545  7 0077 0           MASK   DAPBOOLS
0180                        16,2546  0 0006 1           EXTEND                NODAPNO WILL STOP COLD FIRE PURGE AND
0181   REF   1              16,2547  1 2502 0           BZF    NODAPNO        RESTART-PROTECT MP 7 +X TRANSLATION.

0182   REF   1              16,2550  1 2042 1           TCF    DAPIDLE1      GODAPGO IS ON, SO RUN DAPIDLER NOW.
```

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R0183   SMARTJOB IS A DUMMYJOB-LIKE FUNCTION DESIGNED TO ABSORB IDLE TIME.  IT CAUSES THE COMPUTER-ACTIVITY LAMP TO
R0185   REMAIN ON, AND PREVENTS THE EXISTENCE OF A JOB SLEEPING IN THE LOWEST NUMBERED CORE SET.  IT IS PREVENTED FROM
R0187   STARTING, OR MADE TO TERMINATE IF ALREADY RUNNING, BY MAKING SMARTFLG CONTAIN ANY NEGATIVE VALUE OR ZERO, OR
R0189   BY MAKING SMODE (THE SELFCHECK CONTROL REGISTER) UNEQUAL TO +0.

 0190   REF   7 LAST 442    16,2551  10 067 1  SMARTJOB CCS    NEWJOB          ANY HIGHER PRIORITY JOB WAITING?
 0191   REF   6 LAST 442    16,2552  0 5532 0           TC     CHANG1          YES.  GO DO IT.

 0192   REF   2 LAST 496    16,2553  3 0377 1           CA     SMARTFLG        NO.  SHOULD SMARTJOB TERMINATE?
 0193                       16,2554  0 0006 1           EXTEND
 0194   REF   1            16,2555  6 2562 1           BZMF   STOPSMRT        YES.  GO KILL IT.

 0195   REF   4 LAST 496    16,2556  11'355 1           CCS    SMODE           MAYBE NOT.  SEE IF SELFCHECK WANTED.
 0196   REF   2 LAST 497    16,2557  1 2562 0           TCF    STOPSMRT        WANTED.  TERMINATE SMARTJOB.
 0197   REF   2 LAST 496    16,2560  1 2551 0           TCF    SMARTJOB        NOT WANTED.  CONTINUE SMARTJOB.
 01975                      16,2561  1 2562 0           NOOP                   WANTED.  TERMINATE SMARTJOB.
 0198   REF   25 LAST 496   16,2562  4 7751 1  STOPSMRT CS     BIT11           TERMINATE SMARTJOB.
 0199                       16,2563  0 0006 1           EXTEND                 FIRST, TURN THE SMARTJOB-RUNNING FLAG
 0200   REF   15 LAST 496   16,2564  03 011 1           WAND   DSALMOUT        OFF.

 0201   REF   58 LAST 464   16,2565  1 5567 1           TCF    ENDOFJOB        THEN KILL JOB.

 02011  REF   3 LAST 497    16,2566  3 0377 1  CHKSMART CA     SMARTFLG        IS SMARTJOB DESIRED?
 020114                     16,2567  0 0006 1           EXTEND
 020118 REF   1            16,2570  6 2266 1           BZMF   INSRT16A +1     NO.  TAKE NO ACTION.

 020122 REF   26 LAST 497   16,2571  3 7751 0           CAF    BIT11           YES.  SEE IF IT IS ALREADY RUNNING.
 020126                     16,2572  0 0006 1           EXTEND
 02013  REF   16 LAST 497   16,2573  02 011 0           RAND   DSALMOUT
 020134 REF   232 LAST 496  16,2574  10 000 0           CCS    A
 020138 REF   2 LAST 497    16,2575  1 2266 0           TCF    INSRT16A +1     SMARTJOB IS ALREADY RUNNING.  NO ACTION.

 020142 REF   5 LAST 497    16,2576  11'355 1           CCS    SMODE           NOT RUNNING.  SEE IF SELFCHECK WANTED.
 020146 REF   3 LAST 497    16,2577  1 2266 0           TCF    INSRT16A +1     SELFCHECK IS ON, SO DON'T RUN SMARTJOB.
 02015  REF   1            16,2600  1 2603 1           TCF    SETSMART        SELFCHECK IS OFF, SO START SMARTJOB.
 020154 REF   4 LAST 497    16,2601  1 2266 0           TCF    INSRT16A +1     SELFCHECK IS ON, SO DON'T RUN SMARTJOB.
 020158 REF   5 LAST 497    16,2602  1 2266 0           TCF    INSRT16A +1     DITTO.

 020162 REF   2 LAST 496    16,2603  3 7752 0  SETSMART CAF    PRIO1
 020166 REF   18 LAST 496   16,2604  0 5505 1           TC     NOVAC
 02017  REF   4 LAST 497              E0               EBANK= SMARTFLG
 020174                     16,2605   02551 1          2CADR  SMARTJOB
C020174 REF   3 LAST 497    16,2606   34060 0
 020178 REF   27 LAST 497   16,2607  3 7751 0           CAF    BIT11           SET THE SMARTJOB-RUNNING FLAG.
 020182                     16,2610  0 0006 1           EXTEND
 020186 REF   17 LAST 497   16,2611  05 011 1           WOR    DSALMOUT

 02019  REF   6 LAST 497    16,2612  1 2266 0           TCF    INSRT16A +1     RETURN TO PAXIS.

R0202   **END CODING FOR MODULE 3 REMAKE, AUGUST 1967**** END CODING FOR MODULE 3 REMAKE, AUGUST 1967**********
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L P-AXIS REACTION CONTROL SYSTEM AUTOPILOT USER'S OWN PAGE NO. 7 S3 E6

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R0204  THE FOLLOWING CODING IS LEFT IN PLACE TO PRESERVE ADDRESSES.

 0240                          16,2613  0 0006 1        EXTEND
 0241  REF  18 LAST 474       16,2614  7 7761 1        MP      BIT3          ENOUGH FOR 4 JETS
 0242  REF  32 LAST 493       16,2615  30 001 0        CAE     L
 0243                          16,2616  0 0006 1        EXTEND
 0244  REF   1                 16,2617  7 3576 1        MP      25/32         A CONTAINS TJET SCALED AT 2EXP(4)(16/25)
 0245  REF   8 LAST 493       16,2620  55'611 1        TS      TP
 0246  REF   1                 16,2621  55'475 1        TS      TOFJTCHG

 0247  REF   1                 16,2622  31'462 0        CAE     PRATEDIF      TEST WHETHER 2 OR 4 JETS TO BE USED BY
 0248  REF   4 LAST 489       16,2623  6 1500 0        AD      -2JETLIM      COMPARING DELTA RATE WITH 2 JET LIMIT
 0249                          16,2624  0 0006 1        EXTEND
 0250                          16,2625  6 2631 1        BZMF    +4            IF NEGATIVE, 2 JETS ARE ENOUGH

 0251  REF  23 LAST 484       16,2626  3 7743 0        CAF     POSMAX        POSITIVE, NON-ZERO.  PUT POSMAX IN NJET
 0252  REF   1                 16,2627  55'461 1        TS      NJET
 0253  REF   1                 16,2630  1 2642 1        TCF     PJETSLEC      AND GO SELECT GOOD POLICY

 0254  REF   5 LAST 495       16,2631  3 7745 0        CAF     NEGMAX        2 JETS, PUT NEGMAX IN NJET,
 0255  REF   2 LAST 498       16,2632  55'461 1        TS      NJET
 0256  REF   9 LAST 498       16,2633  31'611 0        CAE     TP            DOUBLE TP,
 0257                          16,2634  6 0000 1        DOUBLE
 0258  REF  10 LAST 498       16,2635  55'611 1        TS      TP            AND GO CHECK MINIMUM IMPULSE

R0259  ..........................................................................
R0260  CHECK RATE COMMAND ON TIME AGAINST MINIMUM IMPULSE
 0261  REF   2 LAST 498       16,2636  55'475 1        TS      TOFJTCHG
 0262  REF   1                 16,2637  6 3577 1        AD      -TJMINT6
 0263                          16,2640  0 0006 1        EXTEND                  AS TP, TEST JET TIME, IS IT GREATER OR
 0264  REF   1                 16,2641  6 2772 1        BZMF    JETSOFF       LESS THAN A MINIMUM IMPULSE
R0265  ..........................................................................
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L P-AXIS REACTION CONTROL SYSTEM AUTOPILOT USER'S OWN PAGE NO. 8 53 E6

P0266 PROGRAM NAME: PJETSLEC DATE: DECEMBER 9, 1966

R0267 MODIFICATION 2 TO SUNBURST REVISION 58 ON DECEMBER 30, 1966 BY JOHN BLISS(ADAMS ASSOCIATES) RM 7-286, X183

R0268 LOG SECTION: P-AXIS REACTION CONTROL SYSTEM AUTOPILOT -- FIRST PUT INTO SUNBURST(III) REVISION 29

R0270 FUNCTIONAL DESCRIPTION:

R0271 THE OBJECT OF PJETSLEC IS TO CHOOSE THE BEST JET POLICY WHOSE NECESSARY JETS HAVE NOT BEEN RECORDED AS
R0273 FAILED IN THE CH6MASK REGISTER. THE CONDITIONS ON SELECTION ARE THE NUMBER OF JETS REQUESTED(2 OR 4), THE
R0275 SENSE OF P-AXIS ROTATION REQUIRED(+/-), AND ALTERNATING USE OF DIAGONAL FORCE-COUPLED PAIRS OF JETS.

R0277 PJETSLEC FIRST READS CHANNEL 6 TO SEE IF THE JETS ARE CURRENTLY FIRING. IF THEY ARE OFF, THE DIAGONAL JETS
R0278 ARE SWITCHED TO COMPLY WITH THE ALTERNATION CONDITION, AS THERE IS NO DANGER OF SWITCHING ONE OFF AND THE OTHER
R0279 ON IN RAPID SUCCESSION. AFTER SWITCHING THE DIAGONALS, OR IF THE JETS ARE ON, 6.5 MS IS ADDED TO THE JET
R0280 FIRING TIME, TOFJTCHG, TO ALLOW FOR DELAY IN TURNING ON THE JETS OR IN CASE THE CURRENT POLICY HAS SUFFERED A
R0281 JET FAILURE AND MUST BE REPLACED. HOWEVER, IF THE SAME JET POLICY IS SELECTED, THE FACT WILL BE DETECTED BEFORE
R0282 THE POLICY IS WRITTEN INTO CHANNEL 6, THE UNNECESSARY 6.5MS DELAY TIME WILL BE DEDUCTED FROM TOFJTCHG. THE TIME
R0283 OF CALCULATION, 5MS, IS SUBTRACTED AT THE SAME TIME IN THE COMBINED CONSTANT, -COM-6.5 = -11.5MS. NOTE THAT IN
R0284 CASE JET FAILURE REQUIRES SELECTION OF A NEW POLICY, TOFJTCHG IS NOT MODIFIED BY -5MS, AND SO THERE WILL BE AN
R0285 OVERSHOOT OF 5MS OF JET FIRING.

R02855 NEXT, THE SENSE OF P-AXIS ROTATION(ROLL) IS TESTED, TO DETERMINE WHICH SET OF JET POLICIES MUST BE INDEXED.

R0287 IF THE P-AXIS IS +, REL = 7, IF -, REL = 0. NJET IS TESTED NEXT; IF POSMAX, 4 JETS DESIRED, REL = REL + 6,
R0289 CTR = 6. IF NEGMAX, 2 JETS DESIRED, REL = REL + 5, CTR = 5. IF 4 JETS DESIRED, GO TO POLICY TESTING LOOP
R0291 WITHOUT TESTING TO SEE WHICH DIAGONAL PAIR IS PREFERRED THIS TIME.

R0292 IF 2 JETS ARE DESIRED, SEE WHETHER NO. 2 PAIR IS PREFERRED. IF IT IS, TEST IT FIRST AND USE IT IF IT'S OK.
R0294 IF IT HAS FAILED, GO TO THE TEST LOOP TO TEST THE POLICIES IN ORDER. IF NO. 1 POLICY IS PREFERRED, GO DIRECTLY
R0296 TO THE TEST LOOP.

R0297 THE TEST LOOP USES REL TO PICK UP THE NEXT POLICY IN PPOLTABL AND CTR TO KEEP TRACK OF THE NUMBER OF
R0299 POLICIES(1-7) TESTED. WHEN A GOOD POLICY IS FOUND, IT IS WRITTEN INTO CHANNEL 6, OTHERWISE THE NEXT POLICY IS
R0301 TRIED. IF NO GOOD POLICIES ARE FOUND, CONTROL GOES TO ABORTJET TO TURN OFF THE JETS AND THE DAP.

R0303 WHEN A GOOD POLICY IS FOUND, CONTROL TRANSFERS TO WRITEPOL. THERE, THE SELECTED POLICY IS COMPARED TO THE
R03035 CURRENT POLICY IN CHANNEL 6. IF THEY ARE NOT THE SAME, EITHER THE JETS HAVE NOT BEEN ON, OR A JET FAILED IN THE
R03043 CURRENT POLICY. IN EITHER CASE, TOFJTCHG HAS ALREADY BEEN INCREASED BY THE 6.5MS JET FIRE DELAY. AS DESCRIBED
R0305 ABOVE, HOWEVER, THE EFFECT OF THE OLD POLICY FIRING DURING THE COMPUTATION IS NOT TAKEN INTO ACCOUNT. THIS IS
R03055 CONSIDERED SAFER, SINCE OTHERWISE, A TOFJTCHG ALREADY CALCULATED NEAR THE MINIMUM IMPULSE TIME MIGHT BE REDUCED
R03063 TO LESS THAN 14MS AND THE RESULT WOULD BE THE EXPLOSION OF THE JETS.

R03065 IF THE JET POLICY IS THE SAME AS THE LAST ONE, THE 6.5MS DELAY TIME IS DEDUCTED FROM TOFJTCHG, AND IN ANY
R03072 CASE, THE POLICY IS WRITTEN INTO CHANNEL 5, +/-2/4 IS STORED IN NO.PJETS, AND BIT9 IS PUT INTO JTSATCHG TO CAUSE
R03076 THE P-AXIS JETS TO BE TURNED OFF ON THE NEXT T6RUPT. CONTROL THEN TRANSFERS TO SKIPTEST.

R0308 CALLING SEQUENCES: NONE SUBROUTINES CALLED:

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R0309                                          WRITEP - WRITES C(A), THE
R0310                                          SELECTED JET POLICY, INTO
R0311                                          CHANNEL 6

R0312  NORMAL EXIT MODES;                      ALARM OR ABORT EXIT MODES:

R0313      TCF SKIPTEST                                EXTEND
R0314                                          DCA     ABORTADR
R0315                                          DTCB

R0316                                                  EBANK= JTSONNOW
R0317                                          ABORTADR 2CADR  ABORTJET

R0318                                          THIS SEQUENCE IS FOLLOWED
R0319                                          IF NONE OF THE POLICIES IS
R0320                                          WITHOUT JET FAILURES

R0321  ERASABLE INITIALIZATION REQUIRED

R0322      TP       =  ) TIME PERIOD OF JET FIRING
R0323      TDFJTCHG =  ) AT T6 SCALING, 625 MICROSECONDS PER BIT
R0324      NJET     =  37777, 40000, DEPENDING ON WHETHER 4 OR 2 JETS DESIRED
R0325      TJETSIGN = +/-00001, DEPENDING ON DESIRED SENSE OF P-AXIS ROTATION
R0326      CH6MASK  =  BITS 1-8 INDICATE WHETHER CORRESPONDING JETS HAVE FAILED - BIT ON IS FAILURE, BIT OFF IS OK.
R03273     DAPBOOLS,BIT5(AORBSYST) =0/1, DEPENDING UPON WHETHER DIAGONAL 1 OR DIAGONAL 2 WAS PREFERRED DURING LAST PASS

R0328  OUTPUT;

R0329      CHANNEL 6 - CONTAINS SELECTED JET POLICY UNLESS NONE IS AVAILABLE
R0330      NO.PJETS  - +/-2/4, SENSE OF P-AXIS ROTATION AND NUMBER OF JETS USED
R0331                  BY POLICY ACTUALLY SELECTED(MAY NOT = 4 IF 4 JETS RE-
R0332                  QUESTED BUT ONE OR MORE JETS FAILED)
R0333    - TDFJTCHG  - MODIFIED BY -5MS OR +6.5MS OR NEITHER, DEPENDING ON WHETHER THE JETS WERE ON, AND WHETHER THE
R0334                  NEW POLICY IS A CHANGE FROM THE OLD OR NOT.
R03343     DAPBOOLS, BIT5(AORBSYST) = 1/0, IF THE INPUT VALUE WAS 0/1, UNLESS JETS WERE ON WHEN PJETSLEC STARTED.

R0335      JTSATCHG  - = BIT9, UNLESS NO POLICIES AVAILABLE

R0336      NJET, TP, TJETSIGN, AND CH6MASK NOT CHANGED BY PJETSLEC

R0337      REL AND CTR ARE LEFT AT THEIR LAST VALUES WHEN THE GOOD POLICY WAS
R0338      FOUND

R0339  DEBRIS:

R0340      REL = ITEMP5
R0341      CTR = ITEMP6
R0342      A,L,Q

 0343                    16,2642  0 0006 1  PJETSLEC EXTEND          BEGIN JET SELECT ROUTINE BY SEEING WHE-
```

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0344                        16,2643  00 006 1          READ    6          THER THE JETS ARE TURNED ON(CHANNEL 6
0345  REF 233 LAST 497      16,2644  10 000 0          CCS     A          NON-ZERO)
0346  REF   1               16,2645  1 2653 1          TCF     ADDELAY    JETS ON, DON'T SWITCH DIAGONALS.

0347  REF   1               16,2646  3 7757 0          CAF     ADRBSYST   JETS NOT ON NOW, START BY SWITCHING BITS
0348  REF  33 LAST 496      16,2647  22 077 1          EXCH    DAPBOOLS   IN DAPBOOLS
0349                        16,2650  0 0006 1          EXTEND             BITS ON - DIAGONAL JETS 15, 7 AND 8, 16
0350  REF  33 LAST 498      16,2651  06 001 0          RXOR    L
0351  REF  34 LAST 501      16,2652  54 077 0          TS      DAPBOOLS   BITS OFF - DIAGONAL JETS 4, 12 AND 3, 11

0352  REF   1               16,2653  3 3565 1  ADDELAY CAF     14-TJMIN   ADD DELAY TIME BECAUSE JETS USUALLY OFF
0353  REF   3 LAST 498      16,2654  27'475 1          ADS     TOFJTCHG   AND EASIER IF JET POLICY NOW HAS FAILED.

0357  REF 158 LAST 496      16,2655  3 7767 0          CAF     ZERO       BEFORE TESTING P-AXIS SIGN,
0358  REF   1               16,2656  54 065 0          TS      REL        INITIALIZE ADDRESSING INDEX AT ZERO
0359  REF   1               16,2657  11'434 1          CCS     TJETSIGN   TEST DIRECTION OF P-AXIS ROTATION(ROLL)
0360  REF  11 LAST 496      16,2660  3 7765 1          CAF     SEVEN      IF POSITIVE, GET POLICY FROM LOWER SEVEN
0361  REF   2 LAST 501      16,2661  26 065 0          ADS     REL        LOCATIONS OF TABLE

0362  REF   3 LAST 498      16,2662  11'461 1          CCS     NJET       SEE IF 4-JET POLICY IS REQUESTED
0363  REF  12 LAST 439      16,2663  3 6306 1          CAF     SIX        IT IS, PICK UP 6 FOR REL AND CTR
0364  REF   1               16,2664  1 2705 0          TCF     FOURJETS   AND GO STORE THEM
0365  REF  12 LAST 420      16,2665  3 7766 1          CAF     FIVE       2 JETS ONLY REQUESTED, PICK UP 5, STORE
0366  REF   1               16,2666  54 066 0          TS      CTR        IN CTR AND ADD TO REL.
0367  REF   3 LAST 501      16,2667  26 065 0          ADS     REL
0368  REF  35 LAST 501      16,2670  4 0077 0          CS      DAPBOOLS   CHECK BITS IN DAPBOOLS TO SEE WHICH PAIR
0369  REF   2 LAST 501      16,2671  7 7757 1          MASK    ADRBSYST   OF DIAGONAL JETS SHOULD BE USED NEXT
0370  REF 234 LAST 501      16,2672  10 000 0          CCS     A
0371  REF   1               16,2673  1 2710 1          TCF     TESTPOL    FIRST PAIR, SO GO TO TESTING LOOP NOW

0372                        16,2674  0 0006 1          EXTEND             SECOND PAIR, DECREMENT REL TO 4 OR 11,
0373  REF   4 LAST 501      16,2675  26 065 0          DIM     REL
0374  REF   5 LAST 501      16,2676  50 065 1          INDEX   REL        PICK UP SECOND DIAGONAL PAIR FROM POLICY
0375  REF   1               16,2677  3 2754 0          CAF     PPOLTABL
0376  REF   2 LAST  88      16,2700  7 0103 1          MASK    CH6MASK    TABLE AND COMPARE WITH FAILURE BITS
0377                        16,2701  0 0006 1          EXTEND
0378  REF   1               16,2702  1 2724 0          BZF     WRITEPOL   THE JETS ARE GOOD, GO WRITE IN CHANNEL

0379  REF   6 LAST 501      16,2703  24 065 1          INCR    REL        THE JET(S) HAVE FAILED FOR THIS POLICY,
0380  REF   2 LAST 501      16,2704  1 2710 1          TCF     TESTPOL    RESTORE REL AND DO TEST POLICY LOOP

0381  REF   7 LAST 501      16,2705  26 065 0  FOURJETS ADS     REL        COME HERE TO SET REL AND CTR FOR 4-JET
03815 REF  13 LAST 501      16,2706  3 6306 1          CAF     SIX                ****ADS STINKS****
0382  REF   2 LAST 501      16,2707  54 066 0          TS      CTR        POLICY REQUESTED.  ALSO, SET CTR =1 HERE

0383  REF   8 LAST 501      16,2710  50 065 1  TESTPOL INDEX   REL        PICK UP NEXT POLICY AS LOCATED RELATIVE
0384  REF   2 LAST 501      16,2711  3 2754 0          CAF     PPOLTABL   TO PPOLTABL BY REL.
0385  REF   3 LAST 501      1 2712   7 0103 1          MASK    CH6MASK    COMPARE WITH FAILURE BITS
0386                        16,2713  0 0006 1          EXTEND
0387  REF   2 LAST 501      16,2714  1 2724 0          BZF     WRITEPOL   THE JETS ARE GOOD, WRITE IN THE CHANNEL
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0388                        16,2715  0 0006 1            EXTEND          THE JET(S) HAVE FAILED FOR THIS POLICY
0389  REF   9 LAST 501     16,2716  26 065 0            DIM     REL     DECREMENT THE INDEX,
0390  REF   3 LAST 501     16,2717  10 066 0            CCS     CTR     SEE IF ALL POLICIES HAVE BEEN TESTED.
0391  REF   3 LAST 501     16,2720  1 2707 1            TCF     TESTPOL -1  CTR NOT ZERO, A = CTR -1, DO LOOP AGAIN
0392                        16,2721  0 0006 1            EXTEND          CTR ZERO, ALL ALLOWABLE POLICIES FAILED
0393  REF   1               16,2722  3 2753 1            DCA     ABORTADR PICK UP 2CADR OF ABORTJET
0394                        16,2723  52 006 0            DTCB            AND GO THERE

0395  REF  10 LAST 502      16,2724  50 065 1  WRITEPOL  INDEX   REL     A GOOD POLICY IS FOUND, PICK IT UP AND
0396  REF   3 LAST 501      16,2725  3 2754 0            CAF     PPOLTABL
03962                       16,2726  0 0006 1            EXTEND          BEFORE WRITING IT, CHECK TO SEE IF THE
03963                       16,2727  06 006 1            RXOR    6       SAME POLICY IS CURRENTLY IN CHANNEL 6.
03964                       16,2730  0 0006 1            EXTEND
03965  REF   1              16,2731  1 2747 0            BZF     SAMEJETS SAME POLICY, GO ADJUST TOFJTCHG
03966  REF  11 LAST 502     16,2732  50 065 1  OK2WRITE  INDEX   REL     DIFFERENT POLICY(CHANNEL 6 WAS ZERO OR A
03967  REF   4 LAST 502     16,2733  3 2754 0            CAF     PPOLTABL JET FAILED IN LAST POLICY).  GET POLICY.
0397  REF   1               16,2734  0 6043 0            TC      WRITEP  GO WRITE IT IN CHANNEL 6 AND RETURN

0398  REF 235 LAST 501      16,2735  10 000 0            CCS     A       THE POLICY IS STILL IN A, TEST NUMBER OF
0399  REF  57 LAST 492      16,2736  3 7762 0            CAF     TWO
0400                        16,2737  1 2741 0            TCF     +2      JETS(BIT15 ON FOR 4-JET POLICIES) AND
0401  REF  16 LAST 446      16,2740  3 7761 0            CAF     FOUR
0402                        16,2741  0 0006 1            EXTEND          MULTIPLY BY TJETSIGN(+/-1) TO GET +/-2,4
0403  REF   2 LAST 501      16,2742  7 1434 1            MP      TJETSIGN
0404  REF   2 LAST 493      16,2743  23'657 1            XCH     NO.PJETS IN L, WHICH IS THEN STORED IN NO.PJETS

0405  REF   9 LAST 493      16,2744  3 7753 1            CAF     BIT9    TURN OFF P-AXIS JETS AFTER TORJET
0406  REF   1               16,2745  55'472 0            TS      JTSATCHG

0407  REF   1               16,2746  1 3374 0            TCF     SKIPTEST CHECK FOR SKIP,PERHAPS TO DO JETLIST

04072 REF   1               16,2747  3 3564 0  SAMEJETS  CAF     -COM-6.5 COME HERE TO ADJUST TOFJTCHG BY FACTOR
04073 REF   4 LAST 501      16,2750  27'475 1            ADS     TOFJTCHG OF 11.5MS(COMP TIME + MINIMP DELAY) WHEN
04074 REF   1               16,2751  1 2732 1            TCF     OK2WRITE CURRENT JET POLICY IS TO BE MAINTAINED.

0408  REF   1                        E6                 EBANK=  JTSONNOW WOULD YOU BELIEVE, EBANK = 6
0409                        16,2752  02374 0  ABORTADR  2CADR   ABORTJET WHERE TO GO WHEN ALL JET POLICIES FAIL
C0409 REF   1               16,2753  40066 0
R0410 ..........*.....................................................................................
R0412 TABLE OF P-AXIS JET POLICIES IS ASSEMBLED HERE TO BE ADDRESSED BY RELATIVE INDEX FROM BASE ADDRESS PPOLTABLE
A0414                                                 CHANNEL 6 BITS          INDEX                   JETS ON

0415                        16,2754  00202 1  PPOLTABL  OCTAL   00202   REL=0   -P NON-FORCE COUPLE 4- 16, 3
0416                        16,2755  00210 1            OCTAL   00210   REL=1   -P NON-FORCE COUPLE 3- 11, 16
0417                        16,2756  00050 1            OCTAL   00050   REL=2   -P NON-FORCE COUPLE 2- 8, 11
0418                        16,2757  00042 1            OCTAL   00042   REL=3   -P NON-FORCE COUPLE 1- 3, 8
0419                        16,2760  00240 1            OCTAL   00240   REL=4   NUMBER TWO FORCE COUPLE- 8, 16
0420                        16,2761  00012 1            OCTAL   00012   REL=5   -P 2-JET FORCE COUPLE- 3, 11
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0421                        16,2762  40252 0          OCTAL  40252      REL=6   +P 4-JET POLICY- 3, 8, 11, 16

0422                        16,2763  00101 1          OCTAL  00101      REL=7   +P NON-FORCE COUPLE 4- 7, 4
0423                        16,2764  00021 1          OCTAL  00021      REL=8D  +P NON-FORCE COUPLE 3- 12, 7
0424                        16,2765  00024 1          OCTAL  00024      REL=9D  +P NON-FORCE COUPLE 2- 15, 12
0425                        16,2766  00104 1          OCTAL  00104      REL=10D +P NON-FORCE COUPLE 1- 4, 15
0426                        16,2767  00005 1          OCTAL  00005      REL=11D NUMBER TWO FORCE COUPLE- 15, 7
0427                        16,2770  00120 1          OCTAL  00120      REL=12D +P 2-JET FORCE COUPLE- 4, 12
0428                        16,2771  40125 0          OCTAL  40125      REL=13D +P 4-JET POLICY- 4, 15, 12, 7

R0429  ....................................................................................................

0431  REF 159 LAST 501      16,2772  3 7767 0  JETSOFF  CAF   ZERO
0432  REF  11 LAST 498      16,2773  55,611 1            TS    TP
0433  REF   5 LAST 502      16,2774  55,475 1            TS    TOFJTCHG
0434  REF   2 LAST 502      16,2775  0 6043 0            TC    WRITEP      TURN ON P JETS USING T6JOB SUBROUTINE
0435  REF  22 LAST 496      16,2776  1 5733 1            TCF   RESJME
R0436  P-AXIS URGENCY FUNCTION CALCULATION

R0437  (NOTE -- M13 = 1 IDENTICALLY IMPLIES NULL MULTIPLICATION.)

0438  REF  17 LAST 493      16,2777  3 0033 1  PURGENCY CA    CDUY        P-ERROR CALCULATION
0439                        16,3000  0 0006 1            EXTEND
0440  REF   4 LAST 476      16,3001  20 767 0            MSU   CDUYD       CDU VALUE - ANGLE DESIRED (Y-AXIS)
0441                        16,3002  0 0006 1            EXTEND
0442  REF  14 LAST 494      16,3003  7 1404 1            MP    M11         (CDUY-CDUYD)M11 SCALED AT PI RADIANS
0443  REF   4 LAST  49      16,3004  57,411 1            XCH   E           SAVE FIRST TERM (OF TWO)
0444  REF  29 LAST 493      16,3005  3 0032 0            CA    CDUX        THIRD COMPONENT
0445                        16,3006  0 0006 1            EXTEND
0446  REF   8 LAST 492      16,3007  20 766 1            MSU   CDUXD       CDU VALUE - ANGLE DESIRED (X-AXIS)
R0447                                                   EXTEND
R0448                                                   MP    M13
0449  REF   5 LAST 503      16,3010  27,411 0            ADS   E           SAVE SUM OF TERMS, NO OVERFLOW EVR

0450  REF   2 LAST 488      16,3011  55,466 0            TS    PERRORR     SAVE P ERROR FOR DISPLAY

04501 REF   5 LAST 476      16,3012  4 0774 1            CS    OMEGAPD     THIS CODING IS COMMON TO BOTH LM DAP AND
04502 REF  12 LAST 494      16,3013  6 1415 0            AD    OMEGAP      SPS-BACKUP MODE.
04503 REF   4 LAST  49      16,3014  55,422 0            TS    EDOTP       EDOTP = OMEGAP - OMEGAPD AT PI/4 RAD/SEC
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P04504 P-AXIS SPS BACK-UP TEST AND SPS BACK-UP CONTROL LOGIC:

```
0451  REF  36 LAST 501    16,3015  30 077 1            CAE    DAPBOOLS      BIT15 = 0 FOR SPS BACK-UP
0452                      16,3016  0 0006 1            EXTEND
0453  REF   1             16,3017  6 3074 1            BZMF   NOBACKUP      DAPBOOLS IS NEVER +0.

R0454 SPS BACK-UP CONTROL LOGIC:

0457  REF   1             16,3020  3 7743 0            CAF    SLOPEMP
0458                      16,3021  0 0006 1            EXTEND
0459  REF   6 LAST 503    16,3022  7 1411 0            MP     E
0460  REF   5 LAST 503    16,3023  6 1422 1            AD     EDOTP
0461                      16,3024  0 0006 1            EXTEND
0462  REF   1             16,3025  6 3061 0            BZMF   PLUSDP

0463  REF   1             16,3026  3 3072 1            CAF    NEGDP

0464  REF  17 LAST 194    16,3027  54 063 0  GCOMPER   TS     ITEMP3
0465  REF   6 LAST 504    16,3030  31'422 1            CAE    EDOTP
0466                      16,3031  0 0006 1            EXTEND
0467  REF   1             16,3032  7 3073 1            MP     ACONSTP
04674 REF 236 LAST 502    16,3033  10 000 0            CCS    A
04676 REF   1             16,3034  1 3067 1            TCF    LIMPRATE
0468                      16,3035  1 3037 1            TCF    +2
04684 REF   2 LAST 504    16,3036  1 3067 1            TCF    LIMPRATE
04686 REF 237 LAST 504    16,3037  22 000 1            LXCH   A
0469                      16,3040  0 0006 1            EXTEND
04694                     16,3041  7 0000 0            SQUARE
0470  REF   7 LAST 504    16,3042  6 1411 1  LIMSQP    AD     E
0471  REF   2 LAST 504    16,3043  6 3072 1            AD     NEGDP
0472                      16,3044  0 0006 1            EXTEND
0473  REF   2 LAST 498    16,3045  6 2772 1            BZMF   JETSOFF
0474  REF   1             16,3046  3 3071 1            CAF    50MS/625
0475  REF  12 LAST 503    16,3047  55'611 1            TS     TP
0476  REF   6 LAST 503    16,3050  55'475 1            TS     TOFJTCHG
0477  REF   6 LAST 498    16,3051  3 7745 0            CAF    NEGMAX
0478  REF   4 LAST 501    16,3052  55'461 1            TS     NJET
0479  REF  18 LAST 504    16,3053  10 063 0            CCS    ITEMP3
0480  REF  33 LAST 474    16,3054  3 7763 1            CAF    BIT1
0481                      16,3055  1 3057 1            TCF    +2
04815 REF  34 LAST 504    16,3056  4 7763 0            CS     BIT1
0482  REF   3 LAST 502    16,3057  55'434 1            TS     TJETSIGN
04825 REF   2 LAST 498    16,3060  1 2642 1            TCF    PJETSLEC
0483  REF   8 LAST 504    16,3061  4 1411 0  PLUSDP    CS     E
0484  REF   9 LAST 504    16,3062  57'411 1            XCH    E
0485  REF   7 LAST 504    16,3063  4 1422 0            CS     EDOTP
0486  REF   8 LAST 504    16,3064  57'422 1            XCH    EDOTP
0487  REF   3 LAST 504    16,3065  4 3072 0            CS     NEGDP
0488  REF   1             16,3066  1 3027 0            TCF    GCOMPER
0489  REF   1             16,3067  3 7747 1  LIMPRATE  CAF    QUARTER
```

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```
0490  REF  1              16,3070  1 3042 0          ICF     LIMSOP
0492                      16,3071  00120 1  50MS/625 OCTAL   00120      TJET = 50 MS IN SPS BACKUP MODE
0493                      16,3072  77644 1  NEGDP    DEC     -0.00555
0494  REF  24 LAST 498              7743   SLOPEMP  EQUALS  POSMAX
0495                      16,3073  00007 0  ACONSTP  OCTAL   00007
```

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P04951 CONTINUATION OF P-AXIS RCS AUTOPILOT:

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0496  REF  32 LAST 481   16,3074  3 7746 0  NOBACKJP  CAF    BIT14
0497  REF   1            16,3075  55'716 1            TS     SIGNTAG        INDICATES EDOT POSITIVE FOR TIME BEING
0500  REF   9 LAST 504   16,3076  11'422 0            CCS    EDOTP
0501  REF   1            16,3077  1 3111 1            TCF    SCALEDOT
0502  REF   1            16,3100  1 3121 1            TCF    PTJETLAW
0503  REF   1            16,3101  1 3103 1            TCF    REFLECT
0504  REF   2 LAST 506   16,3102  1 3121 1            TCF    PTJETLAW
0505  REF   2 LAST  49   16,3103  55'407 1  REFLECT   TS     EDOT
0506  REF  33 LAST 506   16,3104  4 7746 1            CS     BIT14
0507  REF   2 LAST 506   16,3105  55'716 1            TS     SIGNTAG        INDICATES EDOT REALLY NEGATIVE
0508  REF   3 LAST 503   16,3106  4 1466 0            CS     PERROR
0509  REF  10 LAST 504   16,3107  55'411 0            TS     E
0510  REF   3 LAST 506   16,3110  31'407 0            CAE    EDOT           EDOT SCALED AT 45 DEG/SEC
0511  REF  35 LAST 504   16,3111  6 7763 1  SCALEDOT  AD     BIT1
0512                     16,3112  0 0006 1            EXTEND
0513  REF  19 LAST 498   16,3113  7 7761 1            MP     BIT3
0514                     16,3114  0 0006 1            EXTEND
0515  REF   3 LAST 506   16,3115  1 3120 0            BZF    PTJETLAW -1
0516  REF  25 LAST 505   16,3116  3 7743 0            CAF    POSMAX
0517  REF   4 LAST 506   16,3117  1 3121 1            TCF    PTJETLAW
0518  REF  94 LAST 501   16,3120  30 001 0            CAE    L              EDOT NOW SCALED AT 11.25 DEG/SEC
0519  REF   4 LAST 506   16,3121  55'407 1  PTJETLAW  TS     EDOT
0520                     16,3122  0 0006 1            EXTEND
0521  REF   5 LAST 506   16,3123  7 1407 1            MP     EDOT
0522  REF   3 LAST  49   16,3124  55'412 0            TS     EDOT(2)
0523  REF   4 LAST 494   16,3125  3 7771 1            CAF    NEGONE
0524  REF   4 LAST 504   16,3126  55'434 1            TS     TJETSIGN
0525  REF   7 LAST 504   16,3127  3 7745 0            CAF    NEGMAX
0526  REF   5 LAST 504   16,3130  55'461 1            TS     NJET           INDICATES 2 JETS ONLY FOR TIME BEING
0527  REF   4 LAST 506   16,3131  31'412 1            CAE    EDOT(2)
0528                     16,3132  0 0006 1            EXTEND
0529  REF   1            16,3133  7 1440 1            MP     1/2JTSP
0530                     16,3134  0 0006 1            EXTEND
0531  REF  34 LAST 506   16,3135  7 7746 1            MP     BIT14
0532  REF  11 LAST 506   16,3136  6 1411 1            AD     E
0533                     16,3137  0 0006 1            EXTEND
0534  REF   4 LAST 480   16,3140  60 375 0            SU     DB
0535  REF   1            16,3141  55'444 0            TS     FCT1
0536                     16,3142  0 0006 1            EXTEND
0537  REF   1            16,3143  6 3202 1            BZMF   5,6,7,8
05371 REF   1            16,3144  6 3555 1            AD     -5DEG+1
05372                    16,3145  0 0006 1            EXTEND                 IN ERROR BY OVER 5 DEG WITH THE
05373                    16,3146  6 3153 0            BZMF   +5                RATE IN THE OTHER DIRECTION
05374 REF   6 LAST 506   16,3147  4 1407 1            CS     EDOT
05375 REF   1            16,3150  6 3757 1            AD     HULLSLIM       0.5 DEG/SEC SCALED AT 11.25 DEG/SEC
05376                    16,3151  0 0006 1            EXTEND
05377 REF   1            16,3152  6 3177 0            BZMF   MULTIJET
0538  REF   7 LAST 506   16,3153  31'407 0            CAE    EDOT
```

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```
0539                        16,3154  0 0006 1           EXTEND
0540  REF   2 LAST 506     16,3155  7 1440 1           MP      1/2JTSP
0541  REF   1               16,3156  55'510 0           TS      TERMA
0546  REF   1               16,3157  4 3563 0           CS      1.5CSP16
0547  REF   2 LAST 507     16,3160  6 1510 1           AD      TERMA
0548                        16,3161  0 0006 1           EXTEND
0549                        16,3162  6 3165 0           BZMF    +3
0550  REF  35 LAST 506     16,3163  3 7746 0  MAXPTJET  CAF     BIT14
0551  REF   1               16,3164  1 3356 0           TCF     FINDSIGN
0552  REF   2 LAST 506     16,3165  4 1444 0           CS      FCT1
0553  REF   2 LAST 477     16,3166  6 1632 1           AD      DBMNMPAX
0554                        16,3167  0 0006 1           EXTEND
0555  REF   1               16,3170  6 3232 1           BZMF    PMBR
0556  REF   3 LAST 507     16,3171  31'510 1           CAE     TERMA
0557  REF   1               16,3172  6 3554 0           AD      -35AT16
0558                        16,3173  0 0006 1           EXTEND
0559  REF   1               16,3174  6 3342 1           BZMF    ZONE4
0560  REF   1               16,3175  6 3556 1           AD      38.7AT16
0561  REF   1               16,3176  1 3316 1           TCF     SCALTJET
0562  REF  26 LAST 506     16,3177  3 7743 0  MULTIJET  CAF     POSMAX
0563  REF   6 LAST 506     16,3200  55'461 1           TS      NJET
0564  REF   1               16,3201  1 3163 1           TCF     MAXPTJET
0565  REF   5 LAST 506     16,3202  31'412 1  5,6,7,8  CAE     EDOT(2)
0566                        16,3203  0 0006 1           EXTEND
0567  REF   1               16,3204  7 2234 1           MP      .5ACCMIN
0568  REF  12 LAST 506     16,3205  6 1411 1           AD      E
0569  REF   5 LAST 506     16,3206  6 0375 0           AD      DB
0570  REF   3 LAST 507     16,3207  6 1632 1           AD      DBMNMPAX
0571                        16,3210  0 0006 1           EXTEND
0572                        16,3211  6 3213 1           BZMF    +2
0573  REF   3 LAST 504     16,3212  1 2772 0  ZONE5     TCF     JETSOFF
0574  REF   1               16,3213  4 3552 1  +2       CS      RATEMAX
0575  REF   8 LAST 506     16,3214  6 1407 0           AD      EDOT
0576                        16,3215  0 0006 1           EXTEND
0577  REF   1               16,3216  6 3220 1           BZMF    ZONES6,7
0578  REF   4 LAST 507     16,3217  1 2772 0  ZONE8     TCF     JETSOFF
0579  REF  36 LAST 506     16,3220  3 7763 1  ZONES6,7  CAF     BIT1
0580  REF   5 LAST 506     16,3221  55'434 1           TS      TJETSIGN
0581  REF   9 LAST 507     16,3222  4 1407 1           CS      EDOT
0582                        16,3223  0 0006 1           EXTEND
0583  REF   3 LAST 507     16,3224  7 1440 1           MP      1/2JTSP
0584  REF   4 LAST 507     16,3225  55'510 0           TS      TERMA
0585  REF   3 LAST 507     16,3226  4 1444 0           CS      FCT1
0586  REF  13 LAST 507     16,3227  6 1411 1           AD      E
0587  REF  14 LAST 507     16,3230  6 1411 1           AD      E
0588  REF   4 LAST 507     16,3231  6 1632 1           AD      DBMNMPAX
0589  REF   4 LAST 507     16,3232  55'444 0  PMBR     TS      FCT1     FCT1 NOW HOLDS -FCT5 OR -FCT2
0590  REF   4 LAST 507     16,3233  31'440 0           CAE     1/2JTSP
0591                        16,3234  0 0006 1           EXTEND
0592  REF  36 LAST 507     16,3235  7 7746 1           MP      BIT14
```

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```
0593   REF   2 LAST 507    16,3236  6 2234 0            AD      .5ACCMIN
0594   REF   1             16,3237  55,446 1           TS      DENOM
0595                       16,3240  0 0006 1           EXTEND
0596   REF   1             16,3241  7 3553 0           MP      RATEMAX2
0597   REF   5 LAST 507    16,3242  6 1444 1           AD      FCT1
0598                       16,3243  0 0006 1           EXTEND
0599   REF   1             16,3244  6 3322 1           BZMF    MISSROOT
0600   REF   5 LAST 507    16,3245  31,440 0           CAE     1/2JTSP
060005                     16,3246  0 0006 1           EXTEND
06001  REF   6 LAST 508    16,3247  7 1440 1           MP      1/2JTSP     (1/2JTSP)(1/2JTSP) SCALED AT 2(16)/PI(2)
060015 REF  11 LAST 219    16,3250  52 073 1           DXCH    RUPTREG3    DP PRODUCT STORED IN RUPTREG3,RUPTREG4
06002  REF   6 LAST 508    16,3251  31,444 1           CAE     FCT1        SCALED AT PI
060025                     16,3252  22 007 0           ZL
06003                      16,3253  0 0006 1           EXTEND
060035 REF   2 LAST 508    16,3254  11,446 1           DV      DENOM       (FCT1/DENOM) IN A SCALED AT PI(2)/2(8).
06004  REF  32 LAST 365    16,3255  54 071 0           TS      RUPTREG2    (FCT1/DENOM) STORED IN RUPTREG2
060045                     16,3256  0 0006 1           EXTEND
06005  REF  12 LAST 315    16,3257  7 0073 1           MP      RUPTREG4    (FCT1/DENOM)(LOWER PART OF (1/2JTSP)(2))
060055 REF  13 LAST 508    16,3260  54 073 1           TS      RUPTREG4    IS STORED IN RUPTREG4
06006  REF 170 LAST 503    16,3261  3 7767 0           CAF     ZERO
060065 REF  12 LAST 508    16,3262  56 072 1           XCH     RUPTREG3
06007                      16,3263  0 0006 1           EXTEND
060075 REF  33 LAST 508    16,3264  7 0071 0           MP      RUPTREG2    PRODUCT OF SP FCT1/DENOM AND DP
06008  REF  13 LAST 508    16,3265  20 073 1           DAS     RUPTREG3    (1/2JSP)(2) IS STORED DP IN RUPTREG3 AND
060085                     16,3266  0 0006 1           EXTEND              RUPTREG4 AT A SCALING OF 2(8). PRODUCT
06009  REF  14 LAST 508    16,3267  3 0073 0           DCA     RUPTREG3    IS ALSO STORED IN ITEMP3 AND ITEMP4.
060095 REF  19 LAST 504    16,3270  52 064 1           DXCH    ITEMP3
0608   REF   2 LAST 507    16,3271  4 3563 0           CS      1.5CSP16
0609   REF   5 LAST 507    16,3272  6 1510 1           AD      TERMA       SCALED AT 2(4)
0610                       16,3273  0 0006 1           EXTEND
0611                       16,3274  7 0000 0           SQUARE              (TERMA-1.5CSP)(2) IN A,L SCALED AT 2(8)
0612   REF  15 LAST 508    16,3275  20 073 1           DAS     RUPTREG3    DP EXPRESSION STORED IN RUPTREG3 AND
06125  REF  16 LAST 508    16,3276  30 072 1           CAE     RUPTREG3    RUPTREG4. IF NEG, TP EXCEEDS 1.5CSP.
0613                       16,3277  0 0006 1           EXTEND
06135  REF   1             16,3300  1 3302 1           BZF     TESTONL1    IF RUPTREG3 ZERO,MUST TEST ON RUPTREG4
0614   REF   2 LAST 508    16,3301  1 3303 0           TCF     TESTONL1 +1

06141  REF  14 LAST 508    16,3302  30 073 0  TESTONL1 CAE     RUPTREG4
06142                      16,3303  0 0006 1           EXTEND
06143  REF   2 LAST 507    16,3304  6 3163 0           BZMF    MAXPTJET

0615   REF   1             16,3305  4 3560 0  MINTJCHK CS      PTJMINT6    11.5 MS SCALED AT 16. (4MS ADDED TO TMIN
0616   REF   6 LAST 508    16,3306  6 1510 1           AD      TERMA       TO PREVENT COMPUTED TP LESS THAN TMIN)
0617                       16,3307  0 0006 1           EXTEND
0618   REF   1             16,3310  6 3326 0           BZMF    LASTTEST    LASTTEST TESTS FOR TP LESS THAN MIN IMP.
0620                       16,3311  0 0006 1  ROOTNEXT EXTEND
0621   REF  20 LAST 508    16,3312  4 0064 1           DCS     ITEMP3      DP NUMBER SCALED AT 2(8) TO BE ENTERED
06215  REF  18 LAST 495    16,3313  0 5270 1           TC      IBNKCALL    SQUARE ROOT SUBROUTINE CALL.
06216  REF   1             16,3314  54525 1            CADR    DAPSQRT
0622   REF   7 LAST 508    16,3315  6 1510 1  SJMTJ    AD      TERMA
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```
0623                        16,3316  6 0000 1  SCALTJET  DOUBLE
0624                        16,3317  0 0006 1            EXTEND
0625   REF   2 LAST 498    16,3320  7 3576 1            MP      25/32
0626   REF   2 LAST 507    16,3321  1 3356 0            TCF     FINDSIGN
0627   REF   1              16,3322  3 3551 0  MISSROOT  CAF     RATEMAX+        RATEMAX+ = RATEMAX+0.6DEGREES/SECOND
0628                        16,3323  0 0006 1            EXTEND
0629   REF   7 LAST 508    16,3324  7 1440 1            MP      1/2JTSP
0630   REF   1              16,3325  1 3315 1            TCF     SJMTJ
0631                        16,3326  0 0006 1  LASTTEST  EXTEND
063105 REF  21 LAST 508     16,3327  3 0064 0            DCA     ITEMP3
06311  REF  17 LAST 508     16,3330  52 073 1            DXCH    RUPTREG3
063115 REF   2 LAST 508     16,3331  4 3560 0            CS      PTJMINT6        11.5 MS SCALED AT 16
0632   REF   8 LAST 508     16,3332  6 1510 1            AD      TERMA
0633                        16,3333  0 0006 1            EXTEND
0634                        16,3334  7 0000 0            SQUARE
0635   REF  18 LAST 509     16,3335  20 073 1            DAS     RUPTREG3        DP EXPRESSION STORED IN RUPTREG3 AND
063505 REF  19 LAST 509     16,3336  30 072 1            CAE     RUPTREG3        RUPTREG4. IF POS, TP LESS THAN MIN IMP
06351                       16,3337  0 0006 1            EXTEND
063515 REF   1              16,3340  1 3370 1            BZF     TESTONL2        IF RUPTREG3 ZERO, MUST TEST ON RUPTREG4
06352  REF   2 LAST 509     16,3341  1 3371 0            TCF     TESTONL2 +1
0639   REF  10 LAST 507     16,3342  31'407 0  ZONE4     CAE     EDOT            IF EDOT IS ZERO IN ZONE4, NO JETS FIRED
06392                       16,3343  0 0006 1            EXTEND
06395  REF   5 LAST 507     16,3344  1 2772 0            BZF     JETSOFF
06398  REF   3 LAST 506     16,3345  31'716 0            CAE     SIGNTAG
0640                        16,3346  0 0006 1            EXTEND
0641                        16,3347  6 3352 0            BZMF    +3
0642   REF   1              16,3350  4 3561 1            CS      .1DPS
0643                        16,3351  1 3353 0            TCF     +2
0644   REF   2 LAST 509     16,3352  3 3561 0            CA      .1DPS
0645   REF   6 LAST 503     16,3353  6 0774 0            AD      OMEGAPD
0646   REF  13 LAST 503     16,3354  55'415 1            TS      OMEGAP
0647   REF   3 LAST 509     16,3355  3 3560 1            CAF     PTJMINT6
0648   REF  13 LAST 504     16,3356  55'611 1  FINDSIGN  TS      TP
0649   REF   4 LAST 509     16,3357  31'716 0            CAE     SIGNTAG         NEVER ZERO
0650                        16,3360  0 0006 1            EXTEND
0651                        16,3361  6 3363 1            BZMF    +2              EQUIVALENT TO BRANCH ON MINUS
0652                        16,3362  1 3365 0            TCF     +3
0653   REF   6 LAST 507     16,3363  4 1434 1            CS      TJETSIGN
0654   REF   7 LAST 509     16,3364  55'434 1            TS      TJETSIGN
0655   REF  14 LAST 509     16,3365  31'611 0            CAE     TP              LOAD TOFJTCHG
0656   REF   7 LAST 504     16,3366  55'475 1            TS      TOFJTCHG
0657   REF   3 LAST 504     16,3367  1 2642 1            TCF     PJETSLEC        AND GO SELECT GOOD POLICY

06573  REF  15 LAST 508     16,3370  30 073 0  TESTONL2  CAE     RUPTREG4
065735                      16,3371  0 0006 1            EXTEND
06574  REF   1              16,3372  6 3311 1            BZMF    ROOTNEXT
065745 REF   6 LAST 509     16,3373  1 2772 0            TCF     JETSOFF
R0658  TORQUE VECTOR RECONSTRUCTION FOR THE P-AXIS

0659   REF   8 LAST 509     16,3374  4 1475 1  SKIPTEST  CS      TOFJTCHG        COME HERE FROM PJETSLEC TO TEST P SKIP
```

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```
0660  REF   1              16,3375  6 3562 0     AD      +1.5CSP      USE 150 MS. TO TEST FOR A PAXIS SKIP.
0661                       16,3376  0 0006 1     EXTEND
0662  REF   23 LAST 503    16,3377  6 5733 0     BZMF    RESUME       TP GREATER THAN 150MS THEN DO NORMAL P.
0663  REF   1              16,3400  3 3604 0     CA      PSKIPADR     SET UP A P AXIS SKIP.
0664  REF   5 LAST 494     16,3401  55'652 0     TS      PJUMPADR     GOES TO JTLST FROM HERE
```

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R0665 PROGRAM NAME JTLST

R0666 WRITTEN BY DICK GRAY (GAEC - CALL LR-5-1331 AREA CODE 516)

R0667 THIS PROGRAM IN CONJUNCTION WITH T6-RUPT PROGRAMS ALLOWS JETS TO BE
R0668 TURNED OFF AT THE COMPUTED OFF TIME. THIS TASK IS ACCOMPLISHED BY USING
R0669 A JET LIST WHICH IS SET UP AS FOLLOWS ....

	JET OFF TIMES	DESIRED JETS AT THIS TIME
R0671	TIME6	T6NEXTJT
R0672	T6NEXT	T6NEXTJT +1
R0673	T6NEXT +1	T6NEXTJT +2

R0674 THESE LOCATIONS RECEIVE THE JET ON TIMES SCALED AS T6 (.625 MS/BIT). AS
R0675 AN EXAMPLE OF HOW THE PROGRAM WORKS, CONSIDER THE FOLLOWING PROBLEM...
R0676 50 MS AGO A P AXIS JET COMPUTATION DECIDED JETS 12 AND 15 SHOULD BE
R0677 ON FOR 120 MS. AFTER 120 MS IT WAS FURTHER DECIDED THAT JETS 12,15
R0678 15 AND 3 SHOULD BE ON UNTIL THE NEXT P AXIS COMPUTATION (WHICH
R0679 OCCURS IN 200 MS AFTER THE LAST P AXIS JET COMPUTATION). AT THE
R0680 CURRENT TIME THE QR AXES COMPUTES THAT JET 2 SHOULD BE ON FOR 65 MS
R0681 AND JET 9 SHOULD BE ON FOR 72.5 MS. AFTER 72.5 MS NO FURTHER QR JETS
R0682 SHOULD BE ON. THIS SEQUENCE OF JETS CORRESPONDS TO A +P ROTATION
R0683 WITH A SIMULTANEOUS +Y AND -Z TRANSLATION AND ALSO A -V (DIAGONAL)
R0684 ROTATION ABOUT THE Y AND Z AXES . NOTE JET 9 IS ON LONGER THAN JET 2
R0685 WHICH WOULD BE THE CASE IF THE Q-R JETS HAD BEEN ON BEFORE. IN THIS
R0686 CASE, THE FOLLOWING SEQUENCE OF EVENTS OCCURRED AT THE P AXIS
R0687 COMPUTATION .....

R0688 1) CHANNEL 5 WAS LOADED WITH OCTAL 24 TO TURN ON JETS 12 AND 15

R0689 2) TIME 6 WAS LOADED WITH 120 MS

R0690 3) T6NEXT WAS LOADED WITH +0 (THIS INDICATES THE CONTENTS OF
R0691 T6NEXT ARE NOT TO BE USED IN THE T6JOB PROGRAM)

R0692 4) T6NEXTJT WAS LOADED WITH OCTAL 226 TO CAUSE JETS 3,12,15
R0693 AND 16 TO GO ON WHEN T6 HAS BEEN DECREMENTED TO -0.

R0694 5) THE T6 CLOCK WAS TURNED ON TO BEGIN COUNTING DOWN TIME 6

R0695 AT THE QR AXES JET LIST COMPUTATION, THE T6 CLOCK HAS BEEN REDUCED
R0696 TO 70 MS (120-50) THEREFORE THE FOLLOWING OCCURS ....

R0697 1) CHANNEL 5 IS LOADED WITH OCTAL 40022 TO TURN ON JETS 2 AND
R0698 9. (THIS IS PERFORMED IN THE SECTION CALLED RATE)

R0699 2) THE BANK IS SWITCHED FROM THE QR BANK TO THE P BANK (WHERE
R0700 THE JET LIST IS STORED) AS FOLLOWS ....
R0701 DCA JTLSTADR

R0702 JTCB (IN THE QR AXES ONLY)

R0703 3) THE DESIRED JET ON TIME FOR JET 2 IS COMPARED WITH T6.

R0704 4) SINCE T6 IS GREATER THAN THE DESIRED JET ON TIME FOR JET 2,
R0705 T6 IS CHANGED TO 65 MS AND T6NEXT IS LOADED WITH 5 MS.
R0706 (THE DIFFERENCE BETWEEN JET ON TIME AND T6)

R0707 5) T6NEXTJT IS CHANGED TO OCTAL 40020 , AND THE FORMER CONTENTS
R0708 OF T6NEXTJT IS PLACED IN T6NEXTJT +1. THIS CAUSES JET 9 TO
R0709 REMAIN ON AND JET 2 TO BE TURNED OFF WHEN T6 IS DECREMENTED
R0710 TO ZERO. IT ALSO ASSIGNS THE P AXIS JET CODE TO THE
R0711 TIME IN T6NEXT.

R0712 6) THE CONTENTS OF T6NEXT (5MS) IS COMPARED WITH THE
R0713 DIFFERENCE BETWEEN THE TWO QR AXIS JET ON TIMES. SINCE HERE
R0714 THE DIFFERENCE IS 7.5 MS WHICH IS GREATER THAN THE CONTENTS
R0715 OF T6NEXT (5MS), THE ADDITIONAL QR AXIS RUPT OCCURS AFTER
R0716 THE RUPT STORED IN T6NEXT. THUS 2.5 MS (7.5 - 5) IS STORED
R0717 IN T6NEXT +1

R0718 7) T6NEXTJT +2 IS MADE EQUAL TO THE JETS WHICH ARE TO BE ON
R0719 AFTER THE 75 MS HAS ELAPSED (IN THE CASE HERE IT IS ZERO)

R0720 THUS FOR THE EXAMPLE CONSIDERED THE JET LIST IS ....

R0721 JET TIMES JET CODES
R0722 TIME6 = 65MS. T6NEXTJT = 40020 SIGN IS NEGATIVE TO
R0723 T6NEXT = 5 MS. T6NEXTJT +1 = 00226 INDICATES Q-R AXIS
R0724 T6NEXT +1 =2.5 MS. T6NEXTJT +2=, 40000 JETS,POSITIVE TO
R0725 INDICATE P JETS.
R0726 CHANNEL 6 = 00024
R0727 CHANNEL 5 = 00022 SIGN IS LOST ONCE THE JET CODE IS LOADED

R0728 THIS EXAMPLE AND THE CODING SHOULD ALLOW ONE TO UNDERSTAND THE JET LIST.
R0729 ONE FURTHER COMMENT IS IN ORDER - IF THE JET ON TIMES EXCEED 150 MS,
R0730 THE JETS ARE TURNED ON AND THE JET LIST IS NOT ENTERED. IN 100 MS
R0731 A NEW JET ON TIME IS COMPUTED WHICH WILL RESET THE JETS IF NEEDED.
R0732 WHEN THE JET ON TIME IS LESS THAN 150MS, THE JET LIST IS LOADED AS
R0733 DISCUSSED ABOVE AND THE TJET COMPUTATION IS SKIPPED NEXT TIME, THAT IS
R0734 THE AXIS IS NOT REPEATED AGAIN UNTIL 200 MS HAS ELAPSED. THIS INSURES
R0735 THAT WHEN A NEW JET TIME IS COMPUTED THE JET LIST WILL NOT HAVE
R0736 A TIME STORED WHICH CORRESPONDS TO THE AXIS JUST COMPLETED.

```
0737  REF   5 LAST 488     16,3402  10 031 1  JTLST    CCS    TIME6      TEST CURRENT STATE OF T6.
0738  REF   1              16,3403  1 3426 0           TCF    T6ONNOW    IF T6 IS + THEN CLOCK IS ON.
0739  REF   1              16,3404  1 3410 0           TCF    T6OFFNOW   IF T6 IS + ZERO THEN T6 MUST BE OFF
0740  REF   2 LAST 512     16,3405  1 3426 0           TCF    T6ONNOW      SINCE ALL DINC S LEAD TO MINUS ZERO.
0741  REF   1              16,3406  0 6017 1           TC     T6JOB      WE ARE IN THE UNIQUE STATE WHICH SAYS
0742  REF   1              16,3407  1 3402 0           TCF    JTLST        A T6 INTERRUPT IS WAITING.DO T6 JOB.
```

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```
0743  REF   9 LAST 509   16,3410  3 1475 0  T6OFFNOW  CA    TOFJTCHG
0744  REF   6 LAST 512   16,3411  54 031 1            TS    TIME6          WE ARE HERE IF T6 CLOCK IS OFF.
0745  REF  30 LAST 484   16,3412  3 7745 0            CA    BIT15
0746                     16,3413  0 0006 1            EXTEND               TURN CLOCK PULSE FOR T6 ON AND LOAD T6.
0747                     16,3414  05 013 0            WOR   13
0748  REF   2 LAST 502   16,3415  3 1472 1            CA    JTSATCHG
0749  REF   5 LAST 485   16,3416  55'004 0            TS    T6NEXTJT
0750  REF 171 LAST 508   16,3417  3 7767 0            CA    ZERO
0751  REF   2 LAST 488   16,3420  57'474 1            XCH   ADDTLT6        SET UP NEXT T6 INTERRUPT AFTER THE
0752  REF   9 LAST 488   16,3421  55'002 0            TS    T6NEXT           CURRENT ONE IS COMPLETE. ADDTLT6 MAY
0753  REF 172 LAST 513   16,3422  3 7767 0            CA    ZERO             BE ZERO IN WHICH CASE NO MORE T6.
0754  REF   2 LAST 488   16,3423  57'473 0            XCH   ADDT6JTS
0755  REF   6 LAST 513   16,3424  55'005 1            TS    T6NEXTJT +1
0756  REF  24 LAST 510   16,3425  1 5733 1            TCF   RESJME
0757  REF  10 LAST 513   16,3426  11'002 0  T6ONNOW    CCS   T6NEXT           HERE IF T6 IS NOW ON. SEE IF T6NEXT IS
0758  REF   1            16,3427  1 3507 1            TCF   T6NXT=+          ZERO OR NOT.
0759  REF  10 LAST 513   16,3430  4 1475 1            CS    TOFJTCHG         T6NEXT IS NEVER NEGATIVE.
0760  REF   7 LAST 513   16,3431  6 0031 0            AD    TIME6            A CONTAINS T6 - TJET.
0761  REF 238 LAST 504   16,3432  10 000 0            CCS   A                TEST SIGN OF A (SAVING THE DIFFERENCE).
0762  REF 122 LAST 492   16,3433  6 7763 1            AD    ONE
0763  REF   1            16,3434  1 3451 0            TCF   JTSFIRST         TJET IS LESS THAN T6.
0764                     16,3435  1 3436 1            NOOP                   IF DIFFERENCE IS NEGATIVE OR ZERO
0765  REF 123 LAST 513   16,3436  6 7763 1            AD    ONE              WE ADD 1 SO ZERO CAN NEVER BE IN LIST.
0766  REF  11 LAST 513   16,3437  55'002 0            TS    T6NEXT
0767  REF   3 LAST 513   16,3440  3 1472 1            CA    JTSATCHG
0768  REF   7 LAST 513   16,3441  55'005 1            TS    T6NEXTJT +1      BEGIN SETTING UP JETS IN THE JET LIST.
0769  REF 173 LAST 513   16,3442  3 7767 0            CA    ZERO
0770  REF   3 LAST 513   16,3443  57'474 1            XCH   ADDTLT6
0771  REF  12 LAST 513   16,3444  55'003 1            TS    T6NEXT +1
0772  REF 174 LAST 513   16,3445  3 7767 0            CA    ZERO
0773  REF   3 LAST 513   16,3446  57'473 0            XCH   ADDT6JTS
0774  REF   8 LAST 513   16,3447  55'006 1            TS    T6NEXTJT +2
0775  REF  25 LAST 513   16,3450  1 5733 1            TCF   RESJME
0776  REF  13 LAST 513   16,3451  55'002 0  JTSFIRST  TS    T6NEXT           HERE IF TJET IS LESS THAN T6.
0777  REF  11 LAST 513   16,3452  3 1475 0            CA    TOFJTCHG
0778  REF   8 LAST 513   16,3453  54 031 1            TS    TIME6            SWITCH T6 AND TJET)
0779  REF   4 LAST 513   16,3454  3 1472 1            CA    JTSATCHG
0780  REF   9 LAST 513   16,3455  57'004 1            XCH   T6NEXTJT         BEGIN SWITCHING JET WORDS IN JET LIST.
0781  REF  10 LAST 513   16,3456  55'005 1            TS    T6NEXTJT +1
0782  REF   4 LAST 513   16,3457  4 1474 0            CS    ADDTLT6
0783                     16,3460  0 0006 1            EXTEND
0784  REF  26 LAST 513   16,3461  1 5733 1            BZF   RESJME           SEE IF AN ADDITIONAL (QR) JET TIME IS
0785  REF  14 LAST 513   16,3462  6 1002 1            AD    T6NEXT           REQUIRED.
0786  REF 239 LAST 513   16,3463  10 000 0            CCS   A                IF AN ADDITIONAL T6 IS NEEDED, COMPARE
0787  REF 124 LAST 513   16,3464  6 7763 1            AD    ONE              IT WITH THE CONTENTS OF T6NEXT.
0788                     16,3465  1 3476 0            TCF   +11
0789                     16,3466  1 3467 0            NOOP
0790  REF 125 LAST 513   16,3467  6 7763 1            AD    ONE
0791  REF  15 LAST 513   16,3470  55'003 1            TS    T6NEXT +1
0792  REF 175 LAST 513   16,3471  3 7767 0            CA    ZERO
```

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```
0793    REF   5 LAST 513     16,3472  55,474 0            TS    ADDTLT6
0794    REF   4 LAST 513     16,3473  57,473 0            XCH   ADDT6JTS
0795    REF  11 LAST 513     16,3474  55,006 1            TS    T6NEXTJT +2
0796    REF  27 LAST 513     16,3475  1 5733 1            TCF   RESJME
0797    REF  16 LAST 513     16,3476  55,003 1  +11       TS    T6NEXT +1
0798    REF 176 LAST 513     16,3477  3 7767 0            CA    ZERO
0799    REF   6 LAST 514     16,3500  57,474 1            XCH   ADDTLT6
0800    REF  17 LAST 514     16,3501  55,002 0            TS    T6NEXT
0801    REF 177 LAST 514     16,3502  3 7767 0            CA    ZERO
0802    REF   5 LAST 514     16,3503  57,473 0            XCH   ADDT6JTS
0803    REF  12 LAST 514     16,3504  57,005 0            XCH   T6NEXTJT +1
0804    REF  13 LAST 514     16,3505  55,006 1            TS    T6NEXTJT +2
0805    REF  28 LAST 514     16,3506  1 5733 1            TCF   RESJME
0806    REF  12 LAST 513     16,3507  4 1475 1  T6NXT=+    CS    TOFJTCHG
0807    REF   9 LAST 513     16,3510  6 0031 0            AD    TIME6
0808    REF  18 LAST 514     16,3511  6 1002 1            AD    T6NEXT
0809    REF 240 LAST 513     16,3512  10 000 0            CCS   A
0810    REF 126 LAST 513     16,3513  6 7763 1            AD    ONE
0811                         16,3514  1 3523 1            TCF   +7
0812                         16,3515  1 3516 1            NOOP
0813    REF 127 LAST 514     16,3516  6 7763 1            AD    ONE
0814    REF  19 LAST 514     16,3517  55,003 1            TS    T6NEXT +1
0815    REF   5 LAST 513     16,3520  3 1472 1            CA    JTSATCHG
0816    REF  14 LAST 514     16,3521  55,006 1            TS    T6NEXTJT +2
0817    REF  29 LAST 514     16,3522  1 5733 1            TCF   RESJME
0818    REF  35 LAST 506     16,3523  54 001 1  +7        TS    L
0819    REF  13 LAST 514     16,3524  4 1475 1            CS    TOFJTCHG
0820    REF  10 LAST 514     16,3525  6 0031 0            AD    TIME6
0821    REF 241 LAST 514     16,3526  10 000 0            CCS   A
0822    REF 128 LAST 514     16,3527  6 7763 1            AD    ONE
0823    REF   1              16,3530  1 3540 1            TCF   JTSB4T6
0824                         16,3531  1 3532 1            NOOP
0825    REF 129 LAST 514     16,3532  6 7763 1            AD    ONE
0826    REF  20 LAST 514     16,3533  55,002 0            TS    T6NEXT
0827    REF  36 LAST 514     16,3534  3 0001 0            CA    L
0828    REF  21 LAST 514     16,3535  55,003 1            TS    T6NEXT +1
0829    REF   6 LAST 514     16,3536  3 1472 1            CA    JTSATCHG
0830                         16,3537  1 3546 1            TCF   +7
0831    REF  22 LAST 514     16,3540  57,002 1  JTSB4T6    XCH   T6NEXT
0832    REF  23 LAST 514     16,3541  55,003 1            TS    T6NEXT +1
0833    REF  14 LAST 514     16,3542  3 1475 0            CA    TOFJTCHG
0834    REF  11 LAST 514     16,3543  54 031 1            TS    TIME6
0835    REF   7 LAST 514     16,3544  3 1472 1            CA    JTSATCHG
0836    REF  15 LAST 514     16,3545  57,004 1            XCH   T6NEXTJT
0837    REF  16 LAST 514     16,3546  57,005 0  +7        XCH   T6NEXTJT +1
0838    REF  17 LAST 514     16,3547  57,006 0            XCH   T6NEXTJT +2
0839    REF  30 LAST 514     16,3550  1 5733 1            TCF   RESJME
R0840   T-JET LAW FIXED CONSTANTS

0841                         16,3551  36115 1  RATEMAX+   DEC   0.94222
```

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```
0842                        16,3552  34344 0  RATEMAX  DEC    0.88889
0843                        16,3553  31221 1  RATEMAX2 DEC    0.79012
0844                        16,3554  77733 0  -35AT16  DEC    -0.00219
0845                        16,3555  77071 1  -5DEG+1  DEC    -.02772      -5 DEGREES + CCSBIT SCALED AT PI RADIANS
0846                        16,3556  00050 1  38.7AT16 DEC    0.00242
0847                        16,3557  00010 0  TMINAT16 DEC    0.00047
0848                        16,3560  00014 1  PIJMINT6 DEC    0.00073
0849                        16,3561  00044 1  .1DPS    DEC    0.00222
0850                        16,3562  00360 1  +1.5CSP  DEC    +0.01465
08501                       16,3563  00232 1  1.5CSP16 DEC    0.00938
0851                        16,3564  77753 0  -COM-6.5 DEC    -.00122      -SUM OF 5MS COMP TIME AND 6.5MS DELAY
0852                        16,3565  00013 0  14-TJMIN DEC    11
0853                        16,3566  77537 0  NEGCSP1  DEC    -.00977
0854                        16,3567  37775 0  MS30P    OCTAL  37775
0855                        16,3570  34362 1  0.88975  DEC    0.88975
0856                        16,3571  24366 1  15/25    DEC    0.64000
0857                        16,3572  77555 1  -DRATEDB OCTAL  77555        -0.4 DEG/SEC SCALED AT PI/4 RADIANS/SEC
0858                        16,3573  77001 0  -D2JTLIM OCTAL  77001        -1.4 DEG/SEC SCALED AT PI/4
0859                        16,3574  76447 1  -A2JTLIM OCTAL  76447        -2.0 DEG/SEC SCALED AT PI/4
0860                        16,3575  77223 1  -ARATEDB OCTAL  77223        -1.0 DEG/SEC SCALED AT PI/4
0861                        16,3576  31000 0  25/32    DEC    .78125
0862                        16,3577  77764 1  -TJMINT6 OCTAL  77764        -(7.5 MS) + 1 BIT(FOR BZMF), T6 SCALING
0863                        16,3600  00077 1  DAPLOW6  OCT    00077
0864                        16,3601  00600 1  BITS8,9  OCTAL  00600
0865                        16,3602  71462 1  JPM      DEC    -.2          TEMPORARY ESTIMATE
0866                        16,3603  03146 1  CSPATIP  DEC    0.10000      100 MS AT 1.
0867 REF  1                 16,3604  02401 0  PSKIPADR GENADR SKIPPAXS
0868 REF  1                 16,3605  37533 0  JETLWADR CADR   TJETLAW


0869 REF  10 LAST 492       16,3606  22 016 0 SETIDLE  XCH    BANKRUPT     FIRST T5RUPT AFTER FRESH START COMES
086902                      16,3607  0 0006 1         EXTEND
086904 REF  9 LAST 492      16,3610  22 012 1         QXCH   QRUPT
0870 REF  1                 16,3611  3 3640 0         CAF    T5IDADR      HERE.  T5IDLER IS STARTED IN 1 SEC.
0871 REF  8 LAST 494        16,3612  55000 1          TS     T5ADR
0872 REF  1                 16,3613  3 3636 1         CAF    1SECRUPT
0873 REF  5 LAST 496        16,3614  54 030 0         TS     TIME5
087301 REF 19 LAST 508      16,3615  0 5270 1         TC     IBNKCALL
087302 REF  4 LAST 488      16,3616  40114 1          FCADR  STOPRATE
087303 REF 20 LAST 515      16,3617  0 5270 1         TC     IBNKCALL
087304 REF  3 LAST 482      16,3620  40127 1          FCADR  ALLCOAST
08731 REF  1                16,3621  3 3637 0         CAF    DBWIDE
08732 REF  6 LAST 507       16,3622  54 375 1         TS     DB
08733 REF  5 LAST 506       16,3623  3 7771 1         CAF    NEGONE
08734 REF  3 LAST 479       16,3624  55732 1          TS     ADSCOUNT     MAKES APS CODING INACTIVE
0874 REF  31 LAST 514       16,3625  1 5733 1         TCF    RESUME

08745 REF  11 LAST 515      16,3626  22 016 0 T5IDLER  XCH    BANKRUPT     LOOKS FOR GODAPGO TO START THE DAP.
R087451 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********
```

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```
087455                          16,3627  0 0006 1  T5IDLER1 EXTEND
08746  REF  10 LAST 515         16,3630  22 012 1           QXCH   QRUPT

087465 REF   5 LAST 497         16,3631  3 0377 1           CA     SMARTFLG        IS SMARTJOB DESIRED?
08747                           16,3632  0 0006 1           EXTEND
087475 REF   5 LAST 496         16,3633  6 2544 0           BZMF   MORET5ID        NO.  TAKE NO ACTION.

08748  REF  28 LAST 497         16,3634  3 7751 0           CAF    BIT11           YES.  SEE IF IT IS ALREADY RUNNING.
087485 REF   1                  16,3635  1 2524 1           TCF    ADDLT5ID        GO TO ADDITIONAL CODING.

R087487 **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE,AUGUST 1967*******************

0875                            16,3636   37634 1  1SECRUPT OCTAL  37634          1 SECOND SCALED AS TIME5 (100 PULSES)

087505                          16,3637   00707 1  D3WIDE   DEC    0.02778
08751  REF   2 LAST  55                E6                  EBANK= AOSQTERM
08752                           16,3640   03626 0  T5IDADR  2CADR  T5IDLER
C08752 REF   1                  16,3641   34066 0
R0876  DUMMY FILTER RUPT AFTER P-AXIS RUPT.
0877   REF   3 LAST 516                E6                  EBANK= AOSQTERM
0878   REF   2 LAST 496         16,3642  3 3567 0  DJMMYFIL CAF    MS30P           RESET TIMER IMMEDIATELY - DT= 30 MS
0879   REF   6 LAST 515         16,3643  54 030 0           TS     TIME5
0880   REF  12 LAST 515         16,3644  22 016 0           LXCH   BANKRUPT        INTERRUPT LEAD-IN (CONTINUED).

0881                            16,3645  0 0006 1           EXTEND                 SET UP QRAXIS RUPT.
0882   REF   1                  16,3646  3 3756 0           QCA    QFQRAXIS
0883   REF   9 LAST 515         16,3647  53,001 0           QXCH   T5ADR

R0884  INCREMENT AOSTERM IN DESCENT MODE TO IMPROVE RATE DERIVATION DURING QRAXIS CONTROL.

0886   REF  23 LAST 488         16,3650  3 7762 0           CAF    BIT2            STAGE BIT IS ONE FOR DESCENT.
0887                            16,3651  0 0006 1           EXTEND
0888                            16,3652  02 030 0           RAND   30              READ STAGE BIT
0889                            16,3653  0 0006 1           EXTEND
0890   REF   1                  16,3654  1 3716 0           BZF    CHKAPS          NOT IN DESCENT.  HOW ABOUT APS BURN.
0891   REF  17 LAST 495         16,3655  4 0075 1           CS     FLAGWRD1        SEE IF ENGINE IS OFF.
0892   REF   4 LAST 495         16,3656  7 7757 1           MASK   ENGINBIT        READ COMPLEMENT OF ENGINE-ON FLAG.
0893                            16,3657  1 3660 0           NOOP
0894                            16,3660  0 0006 1           EXTEND
0895   REF   1                  16,3661  1 3666 0           BZF    DLOOPBGN        ZERO WHEN ENGINE IS NOT OFF.

0896   REF 178 LAST 514         16,3662  3 7767 0           CAF    ZERO            YES.  ENGINE IS OFF.
0897   REF   4 LAST 516         16,3663  55,664 0           TS     AOSQTERM
0898   REF   1                  16,3664  55,665 1           TS     AOSRTERM
0899   REF   3 LAST 104         16,3665  1 5735 1           TCF    NOQRSM          RESUME.
0900   REF  37 LAST 507         16,3666  3 7763 1  DLOOPBGN CAF    BIT1            FIRST THE R-AXIS, THEN THE Q-AXIS.
0901   REF  61 LAST 493         16,3667  54 061 1  DLOOP    TS     ITEMP1
0902                            16,3670  6 0000 1           DOUBLE
0903   REF  25 LAST 331         16,3671  54 062 1           TS     ITEMP2
0904   REF  62 LAST 516         16,3672  50 061 0           INDEX  ITEMP1
```

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```
 0905   REF   1                16,3673  3 3751 1          CA     PITCHBITS
 0906                          16,3674  0 0006 1          EXTEND
 0907                          16,3675  02 012 0          RAND   12              IS PITCH(ROLL) GIMBAL MOVING.
 0908                          16,3676  0 0006 1          EXTEND
 0909   REF   1                16,3677  1 3713 0          BZF    DLOOPCHK         ZERO WHEN GIMBAL IS NOT MOVING.

R0910   FORM QACCDOT*CSP(2)*(1-.5*K) SCALED AT PI/4.  THIS IS THE INCREMENT TO BE ADDED TO THE OFFSET ACCELERATION TERM.

 0912   REF   5 LAST 494       16,3700  4 1642 1          CS     (1-K)            (1-K) SCALED AT 1.  CS TO COMPENSATE FOR
A09125                                                                           INVERTED SIGN OF QACCDOT.
 0913                          16,3701  0 0006 1          EXTEND
 0914   REF   10 LAST 502      16,3702  7 7753 0          MP     BIT9             .5*(1-K) , SCALED AT 2(5).
 0915   REF   1                16,3703  6 3760 0          AD     NEGBIT9          (1.-.5*K) SCALED AT 2(5).
 0916                          16,3704  0 0006 1          EXTEND
 0917   REF   1                16,3705  7 3753 1          MP     CSPSQ            CSP(2)*(1.-.5*K) AT 2(5)
 0918                          16,3706  0 0006 1          EXTEND
 0919   REF   26 LAST 516      16,3707  5 0062 0          INDEX  ITEMP2           SELECT THE AXIS .
 0920   REF   2 LAST 495       16,3710  7 1533 1          MP     QACCDOT          QACCDOT AT PI/2(7).
 0921   REF   53 LAST 516      16,3711  50 061 0          INDEX  ITEMP1
 0922   REF   5 LAST 516       16,3712  27'664 0          ADS    ADSQTERM         ADD INCREMENT SCALED AT PI/4.
 0923   REF   54 LAST 517      16,3713  10 061 1  DLOOPCHK CCS    ITEMP1
 0924   REF   1                16,3714  1 3667 1          TCF    DLOOP            R-AXIS DONE.  NOW DO THE Q-AXIS.
 0925   REF   4 LAST 516       16,3715  1 5735 1          TCF    NOQRSM           RESUME.
092505  REF   4 LAST 515       16,3716  11'732 1  CHKAPS   CCS    ADSCOUNT         4 WAY BRANCH EXPLOITED
09251   REF   1                16,3717  1 3737 0          TCF    DECCOUNT         COUNTING DOWN FOR AOSTASK
092515  REF   1                16,3720  1 3741 1          TCF    ADSNEXT          TIME TO DO AOSTASK
09252   REF   5 LAST 517       16,3721  1 5735 1          TCF    NOQRSM           AOSCOUNT NOT IN USE.INACTIVE AOSTASK.
09253   REF   2 LAST  54       16,3722  55'624 1          TS     SAVRATEQ         MINUS ZERO PUT IN AOSCOUNT BY ADSENGON.
092533  REF   1                16,3723  55'625 0          TS     SAVRATER
092534  REF   2 LAST  54       16,3724  55'622 1          TS     SAVRATEQ
092535  REF   1                16,3725  55'623 0          TS     SAVRATER
092536  REF   4 LAST 478       16,3726  55'650 1          TS     KCDEFCTR
09254   REF   3 LAST 488       16,3727  4 1416 1          CS     OMEGAQ           RECORD -(OLD OMEGA) FOR BOTH AXES FOR
092545  REF   2 LAST  54       16,3730  55'626 0          TS     OLDWFORQ
09255   REF   6 LAST 488       16,3731  4 1420 1          CS     OMEGAR           THE FIRST PASS OF AOSTASK.
092555  REF   1                16,3732  55'627 1          TS     OLDWFORR
09257   REF   37 LAST 504      16,3733  4 0077 0          CS     DAPBOOLS
092575  REF   2 LAST 477       16,3734  7 7754 1          MASK   APSGOING
09258   REF   38 LAST 517      16,3735  26 077 0          ADS    DAPBOOLS
092585  REF   1                16,3736  3 3750 0          CAF    19DECIML

092586  REF   5 LAST 517       16,3737  55'732 1  DECCOUNT TS     ADSCOUNT
092587  REF   6 LAST 517       16,3740  1 5735 1          TCF    NOQRSM

092588  REF   2 LAST 517       16,3741  3 3750 0  ADSNEXT  CAF    19DECIML
092589  REF   6 LAST 517       16,3742  55'732 1          TS     ADSCOUNT
09259                          16,3743  0 0006 1          EXTEND
092591  REF   1                16,3744  3 3747 0          DCA    TOADSTSK
092592                         16,3745  52 005 0          DTCF
```

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```
 092593                    16,3746   41245 1  TDAOSTSK 2FCADR ADSTASK
C092593 REF   1            16,3747   03245 1
 092594                    16,3750   00023 0  19DECIML 2DEC    19
 0926                      16,3751   01400 1  PITCHBIS 2OCT    01400      PITCH GIMBAL BITS  (9,10).
 0927                      16,3752   06000 1           2OCT    06000      ROLL GIMBAL BITS,  (11,12).
 0928                      16,3753   00243 1  CSPSQ    2OCT    00243      .01 SCALED AT 1, FOR CSP(2).
 0929                      16,3754   37776 0  TWENTYMS 2OCT    37776      20 MS FOR T5.
 0930   REF   3 LAST 488                E6              2EBANK= 2ERROR
 0931                      16,3755   02002 1  DFQRAXIS 2CADR   2RAXIS
C0931   REF   1            16,3756   36066 1
 0932                      16,3757   01330 0  HJLLSLIM 2DEC    0.04444    0.5 DEG/SEC SCALED AT 11.25 DEG/SEC
 0933                      16,3760   77377 1  NEGBIT9  2OCT    -400
 0934                      16,3761   37777 1  CHKSUM16 2OCT    37777
```

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```
 0001                                17,2000          BANK   17
R0003   THE FOLLOWING TSRUPT ENTRY BEGINS THE PROGRAM WHICH CONTROLS THE Q,R-AXIS ACTION OF THE LEM USING THE RCS JETS.
R0005   THE NOMINAL TIME BETWEEN THE Q,R-AXIS RUPTS IS 100 MS (UNLESS THE TRIM GIMBAL CONTROL SYSTEM IS USED, IN WHICH
R0007   CASE THIS PROGRAM IS IDLE).

 0008   REF   8 LAST 492                    E6           EBANK= DT
 0009                        17,2000   03033 1  NULLFILT 2CADR  FILDUMMY
C0009   REF   1             17,2001   40066 0
 00095  REF   9 LAST 519                    E6           EBANK= DT

 0010   REF   1             17,2002  3 2560 0  QRAXIS   CAF    MS20QR          RESET TIMER IMMEDIATELY - DT= 20 MS
 0011   REF   7 LAST 516    17,2003   54 030 0           TS     TIME5

 0012   REF  13 LAST 516    17,2004   22 016 0           LXCH   BANKRUPT        INTERRUPT LEAD IN (CONTINUED)
 0013                        17,2005   0 0006 1           EXTEND
 0014   REF  11 LAST 516    17,2006   22 012 1           QXCH   QRUPT

R0015   SET UP A DUMMY KALMAN FILTER TSRUPT.  (THIS MAY BE RESET TO THE KALMAN FILTER INITIALIZATION PASS, IF THE TRIM
R0017   GIMBAL CONTROL SYSTEM SHOULD BE USED.)

 0018                        17,2007   0 0006 1           EXTEND
 0019   REF   1             17,2010   3 2001 1           QCA    NULLFILT

R00195  START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

 0020   REF   1             17,2011   1 2107 1  INSERT17 TCF    TRMCHECK        ARE EXTRAORDINARY GTS ENTRIES NEEDED%
R00205  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

R0021   CALCULATE LEM BODY RATES FOR Q AND R AXES:

R0022   THIS COMPUTATION IS VALID FOR BOTH ASCENT AND DESCENT SINCE THE OFFSET ACCELERATION TERM IS INCLUDED ALWAYS,
R0024   BUT HAS VALUE ZERO IN DESCENT, AND SINCE THE WEIGHTING FACTORS ARE IN ERASABLE AND DISTINCT.

R0026   FIRST, CONSTRUCT Y AND Z CDU INCREMENTS:

 0027   REF  18 LAST 503    17,2012   30 033 1  BODYRATE CAE    CDUY            2'S COMPLEMENT MEASUREMENT SCALED AT PI.
 0028   REF  97 LAST 514    17,2013   54 001 1           TS     L               (SAVE FOR UPDATING OF OLDYFORQ)
 0029                        17,2014   0 0006 1           EXTEND                 FORM INCREMENT IN CDUY FOR LAST 100 MS
 0030   REF   2 LAST 489    17,2015  21'427 0            MSU    OLDYFORQ        (100 MS OLD CDUY SAVED FROM LAST PASS)
 0031   REF   3 LAST 519    17,2016  23'427 1            LXCH   OLDYFORQ        UPDATE OLDYFORQ WITH NEW CDUY VALUE
 0032   REF  55 LAST 517    17,2017   54 061 1           TS     ITEMP1          SAVE 1'S COMPLEMENT VALUE TEMPORARILY
 0033   REF  12 LAST 448    17,2020   30 034 0           CAE    CDUZ            2'S COMPLEMENT MEASUREMENT SCALED AT PI
 0034   REF  98 LAST 519    17,2021   54 001 1           TS     L               (SAVE FOR UPDATING OF OLDZFORQ)
 0035                        17,2022   0 0006 1           EXTEND                 FORM INCREMENT IN CDUZ FOR LAST 100 MS
 0036   REF   1             17,2023  21'430 0            MSU    OLDZFORQ        (100 MS OLD CDUZ SAVED FROM LAST PASS)
 0037   REF   2 LAST 519    17,2024  23'430 1            LXCH   OLDZFORQ        UPDATE OLDZFORQ WITH NEW CDUZ VALUE
 0038   REF  27 LAST 517    17,2025   54 062 1           TS     ITEMP2          SAVE 1'S COMPLEMENT VALUE TEMPORARILY
```

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P0039 SECOND, TRANSFORM CDU INCREMENTS TO BODY-ANGLE INCREMENTS:

```
0040  REF  2 LAST 136   17,2026  31'406 1   CAE   M31      MATRIX*VECTOR(WITH X COMPONENT ZERO)
0041                    17,2027  0 0006 1   EXTEND
0042  REF 56 LAST 519   17,2030  7 0061 1   MP    ITEMP1   M31 * ITEMP1 = M31 * DELTA CDUY
0043  REF 16 LAST 193   17,2031  52 065 0   DXCH  ITEMP4
0044  REF  3 LAST 136   17,2032  31'403 1   CAE   M32      M32 * ITEMP2 = M32 * DELTA CDUZ
0045                    17,2033  0 0006 1   EXTEND
0046  REF 28 LAST 519   17,2034  7 0062 1   MP    ITEMP2   DELTAR = M31*(DEL CDUY) + M32*(DEL CDUZ)
0047  REF 17 LAST 520   17,2035  20 065 0   DAS   ITEMP4   DOUBLE PRECISION R BODY ANGLE INCREMENT

0048  REF 11 LAST 517   17,2036  3 7753 1   CAF   BIT9
0049  REF 191 LAST 494  17,2037  54 002 1   TS    Q
0050                    17,2040  0 0006 1   EXTEND
0051  REF 18 LAST 520   17,2041  3 0065 1   DCA   ITEMP4
0052                    17,2042  0 0006 1   EXTEND
0053  REF 192 LAST 520  17,2043  10 002 1   DV    Q        RESCALE TO PI/64 AND
0054  REF 19 LAST 520   17,2044  54 064 1   TS    ITEMP4   STORE AS SINGLE PRECISION
0055  REF  2 LAST 136   17,2045  31'405 1   CAE   M21      MATRIX*VECTOR(WITH X COMPONENT ZERO)
0056                    17,2046  0 0006 1   EXTEND         CLOBBERS ITEMP2=DEL CDUZ, FOR EFFICIENCY
0057  REF 57 LAST 520   17,2047  7 0061 1   MP    ITEMP1   M21 * ITEMP1 = M21 * DELTA CDUY
0058  REF 29 LAST 520   17,2050  52 063 0   DXCH  ITEMP2   M22 * ITEMP2 = M22 * DELTA CDUZ
0059                    17,2051  0 0006 1   EXTEND
0060  REF  4 LAST 136   17,2052  7 1401 1   MP    M22      DELTAQ = M21*(DEL CDUY) + M22*(DEL CDUZ)
0061  REF 30 LAST 520   17,2053  20 063 0   DAS   ITEMP2   DOUBLE PRECISION Q-BODY-ANGLE INCREMENT
0062                    17,2054  0 0006 1   EXTEND
0063  REF 31 LAST 520   17,2055  3 0063 1   DCA   ITEMP2
0064                    17,2056  0 0006 1   EXTEND
0065  REF 193 LAST 520  17,2057  10 002 1   DV    Q        RESCALE TO PI/64
```

R0066 FINALLY, DERIVE Q AND R BODY ANGULAR RATES:

```
0067                    17,2060  0 0006 1   EXTEND         WFORQR IS K/(NOMINAL DT) SCALED AT 16
0068  REF  3 LAST 490   17,2061  7 1641 1   MP    WFORQR   FORM WEIGHTED VALUE OF MEASURED DATA
0069  REF  4 LAST 517   17,2062  57'416 0   XCH   OMEGAQ   SAVE AND BEGIN TO WEIGHT VALUE OF OLD W
0070                    17,2063  0 0006 1   EXTEND         (1-K) IS SCALED AT 1 FOR EFFICIENT CALC
0071  REF  6 LAST 517   17,2064  7 1642 1   MP    (1-K)    (K CHANGES EVERY 2 SECONDS IN ASCENT.)
0072  REF  2 LAST 488   17,2065  6 1605 0   AD    JETRATEQ WEIGHTED TERM DUE TO JET ACCELERATION
0073  REF  6 LAST 517   17,2066  6 1664 1   AD    ADSRTERM TERM DUE TO ASCENT OFFSET ACCELERATION
0074  REF  5 LAST 520   17,2067  27'416 1   ADS   OMEGAQ   TOTAL RATE ESTIMATE SCALED AT PI/4

0075  REF 20 LAST 520   17,2070  30 064 0   CAE   ITEMP4   GET DELTAR
0076                    17,2071  0 0006 1   EXTEND         WFORQR IS K/(NOMINAL DT) SCALED AT 16
0077  REF  4 LAST 520   17,2072  7 1641 1   MP    WFORQR   FORM WEIGHTED VALUE OF MEASURED DATA
0078  REF  7 LAST 517   17,2073  57'420 0   XCH   OMEGAR   SAVE AND BEGIN TO WEIGHT VALUE OF OLD W
0079                    17,2074  0 0006 1   EXTEND         (1-K) IS SCALED AT 1 FOR EFFICIENT CALC
0080  REF  7 LAST 520   17,2075  7 1642 1   MP    (1-K)    (K CHANGES EVERY 2 SECONDS IN ASCENT.)
0081  REF  2 LAST 488   17,2076  6 1606 0   AD    JETRATER WEIGHTED TERM DUE TO JET ACCELERATION
0082  REF  2 LAST 516   17,2077  6 1665 0   AD    ADSRTERM TERM DUE TO ASCENT OFFSET ACCELERATION
0083  REF  8 LAST 520   17,2100  27'420 1   ADS   OMEGAR   TOTAL RATE ESTIMATE SCALED AT PI/4
```

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```
 0084   REF   1                17,2101  0 1653 0                 TC     QJUMPADR
 0085   REF   1                17,2102  3 2105 1  SKIPQRAX      CA     NORMQADR
 0086   REF   2 LAST 521       17,2103  55'653 1                 TS     QJUMPADR      DO NOT JUMP NEXT TIME.
 0087   REF   1                17,2104  1 2610 0                 TCF    CHKGIMBL      CHKGIMBL ATTEMPTS TO USE GTS.

 0088   REF   2 LAST 491       17,2105   02106 1  NORMQADR GENADR NORMALQ
 0089   REF   1                17,2106  1 2620 0  NORMALQ  TCF    AITSTEER      NO RHC INPUTS ON 206.

R00891  START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

 0090   REF  10 LAST 516       17,2107  53'001 0  TRMCHECK DXCH   T5ADR        SET UP NEXT T5RUPT ADDRESS.

R00901  CHECK IF TRIMCNTR HAS BEEN COUNTED DOWN TO ZERO, INDICATING THAT 20.0 SECONDS HAVE PASSED SINCE DPS ON AND
R00903  CONTROL SHOULD BE TRANSFERRED TO GTS.  THEN SEE IF A RECENT ENGINE-ON REQUIRES AN EARLY GTS ENTRY.

 0091   REF   3 LAST 494       17,2110  11'744 0           CCS    TRIMCNTR      IS GTS NEEDED PRIOR TO THROTTLE-UP%
 0092   REF   1                17,2111  1 2121 0           TCF    CHKMNITR        NOT YET, BUT CHECK IF FIRST GTS DONE.
 0093   REF  15 LAST 494       17,2112  0 4736 1           TC     CCSHOLE         ILLEGAL VALUE OF TRIMCNTR.
 0094   REF   1                17,2113  1 2012 1           TCF    INSERT17 +1     NOT ACTIVE, RETURN TO RCS CONTROL.
 00945  REF   4 LAST 481       17,2114  3 7762 0  OKAYGTS   CAF    JSEQRJTS        YES, IS GIMBAL SYSTEM USABLE%
 0095   REF  39 LAST 517       17,2115  7 0077 0           MASK   DAPBOOLS
 0096                          17,2116  0 0006 1           EXTEND
 0097   REF   1                17,2117  1 2124 0           BZF    GOGIMBAL      USABLE.  GO TO GTS.
 0098   REF   2 LAST 521       17,2120  1 2012 1           TCF    INSERT17 +1   NOT USABLE.  GO ON WITH RCS CONTROL.

 0099   REF   1                17,2121  11'745 1  CHKMNITR CCS    GTSMNITR      IS AN IMMEDIATE (FIRST) GTS CALLED FOR%
 0100   REF   1                17,2122  1 2114 0           TCF    OKAYGTS         YES, CHECK IF GIMBAL SYSTEM USABLE.
 0101   REF   3 LAST 521       17,2123  1 2012 1           TCF    INSERT17 +1     NO, RETURN TO RCS CONTROL.
 01044  REF  24 LAST 416       17,2124  4 6311 0  GOGIMBAL CS     THREE         RESET TIME5 COUNTER FROM 20 TO 50 MSEC.
 01045  REF   8 LAST 519       17,2125  26 030 0           ADS    TIME5

 010451 REF   1                17,2126  4 2614 1           CS     BGIM24        TURN OFF GIMBALS FOR BETTER FILTERING.
 010453                        17,2127  0 0006 1           EXTEND
 010455                        17,2130  03 012 1           WAND   12

 0105   REF  38 LAST 516       17,2131  4 7763 0           CS     BIT1          DEACTIVATE GIMBAL DRIVE TIMERS
 0106   REF   7 LAST 495       17,2132  55'753 0           TS     QGIMTIMR
 0107   REF   7 LAST 495       17,2133  55'754 1           TS     RGIMTIMR

 0113   REF 179 LAST 516       17,2134  3 7767 0           CAF    ZERO
 0114                          17,2135  0 0006 1           EXTEND
 0115                          17,2136  01 005 0           WRITE  5             TURN OFF ALL Q,R AXIS JETS.

 0116                          17,2137  0 0006 1           EXTEND
 01162  REF   1                17,2140  3 2143 0           QCA    ADRGOGTS
 01164                         17,2141  52 006 0           QTCB
 01166  REF  10 LAST 519                      E6           EBANK= DT
 01168                         17,2142   03606 1  ADRGOGTS 2CADR  GOTOGTS +2    TIME5 COUNTER WAS ALREADY ADVANCED.
C01168  REF   1                17,2143   42066 1
R0117   *** THE FOLLOWING NEW CODING IS NOT BEING USED  ***
```

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R011705 LEFT IN PLACE AS FILLER)))MAY BE WRITTEN OVER

```
 01171  REF  16 LAST 521   17,2144  0 4736 1            TC      CCSHOLE          FILLER
 01172  REF  17 LAST 522   17,2145  0 4736 1            TC      CCSHOLE          FILLER
 01173  REF  18 LAST 522   17,2146  0 4736 1            TC      CCSHOLE          FILLER
 01174  REF  19 LAST 522   17,2147  0 4736 1            TC      CCSHOLE          FILLER
 01175  REF  20 LAST 522   17,2150  0 4736 1            TC      CCSHOLE          FILLER
 01176  REF  21 LAST 522   17,2151  0 4736 1            TC      CCSHOLE          FILLER
 01177  REF  22 LAST 522   17,2152  0 4736 1            TC      CCSHOLE          FILLER
 01178  REF  23 LAST 522   17,2153  0 4736 1            TC      CCSHOLE          FILLER
 0118   REF  24 LAST 522   17,2154  0 4736 1            TC      CCSHOLE          FILLER
 0119   REF   3 LAST 495                 E6            EBANK=  NEGJR
 0120                      17,2155    03236 0  RGIMADR 2CADR   OFFGIMR
C0120   REF   1            17,2156    42066 1
 0121   REF   1            17,2157  31'746 0  GETCNTR  CAE     FORCETRM         LOAD TRIMCNTR TO FORCE TRIM JUST BEFORE
 0122   REF   4 LAST 521   17,2160  55'744 0            TS      TRIMCNTR         THE THROTTLE-UP.
 0123   REF  39 LAST 521   17,2161  3 7763 1            CAF     BIT1             ENABLE MONITOR TO CALL GTS AS SOON AS
 0124   REF   2 LAST 521   17,2162  55'745 1            TS      GTSMNITR         POSSIBLE.

012405  REF   1            17,2163  31'765 1            CAE     SIMPINIT         INITIALIZE SIMPCNTR. DECISECONDS.
 01241  REF   3 LAST 494   17,2164  55'764 1            TS      SIMPCNTR

 0125                      17,2165  0 0006 1            EXTEND                   RETURN TO ORIGINAL CODING
 0126   REF   1            17,2166  3 2172 1            DCA     INSRTADR
 0127                      17,2167  52 006 0            DTCB

 0128   REF  25 LAST 522   17,2170  0 4736 1            TC      CCSHOLE          THIS IS A FILLER
 0129   REF   4 LAST 506                 E6            EBANK=  PERROR
 0130                      17,2171    02232 0  INSRTADR 2CADR   INSERT20 +1
C0130   REF   1            17,2172    40066 0
 0149   REF   2 LAST 481   17,2173  4 0376 1  17INSRT  CS      /TEMP1/          COMPARE Q WITH THE GENADR OF SWRETURN
 01491  REF   1            17,2174  6 2264 0            AD      SWRETADR         TO SEE IF ENGINOFF WAS CALLED VIA
 01492                     17,2175  0 0006 1            EXTEND                   BANKCALL OR IBNKCALL.
 01493  REF   1            17,2176  1 2243 1            BZF     17INSRTB         *BANKCALL - DO NOT DELAY*

 01495                     17,2177  0 0006 1            EXTEND                   *IBNKCALL - CHECK FURTHER*
 0150                      17,2200  00 030 1            READ    30
 0151                      17,2201  4 0000 0            COM                      SEE IF ENGINE IN QUESTION IS APS OR DPS.
 0152   REF  24 LAST 516   17,2202  7 7762 1            MASK    BIT2
 0153                      17,2203  0 0006 1            EXTEND
 01535  REF   2 LAST 522   17,2204  1 2243 1            BZF     17INSRTB         *DPS ENGINE - DO NOT DELAY*

 01536  REF  10 LAST 321   17,2205  4 0302 1            CS      MODREG           *APS ENGINE - CHECK FURTHER*
 01537  REF   1            17,2206  6 2265 1            AD      MP3MMODE
 01538                     17,2207  0 0006 1            EXTEND                   SEE IF THIS IS THE MP 3 SHORT APS BURN.
 01539  REF   3 LAST 522   17,2210  1 2243 1            BZF     17INSRTB         *IT IS - DO NOT DELAY*

 015391 REF   2 LAST 101   17,2211  4 1074 1            CS      DVMNEXIT         *IT IS NOT - CHECK FOR A FORGET2 ENTRY*
 015392 REF   1            17,2212  6 2266 1            AD      KILLAVEG
 015393                    17,2213  0 0006 1            EXTEND
```

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015394 REF  1            17,2214  1 2257 1          BZF    17INSRTD     GENADRS MATCH - CHECK THE BBCONS.

0154                     17,2215  0 0006 1 17INSRTE EXTEND
0155   REF  1            17,2216  4 1760 0          DCS    /TEMP3/
0156   REF  20 LAST 509  17,2217  52 073 1          DXCH   RUPTREG3     PUT MINUS (ENGINEON TIME) IN RUPTREGS
0157   REF  1            17,2220  53'762 1          DXCH   /TEMP5/     AND SAVE FORMER CONTENTS FOR ISWRETRN.

0158                     17,2221  0 0006 1          EXTEND              BLEND IN THE CURRENT TIME.
0159   REF  19 LAST 481  17,2222  3 0025 0          DCA    TIME2
0160   REF  21 LAST 523  17,2223  20 073 1          DAS    RUPTREG3

01601  REF  15 LAST 432  17,2224  3 7746 0          CAF    HALF         FORCE SIGN AGREEMENT.
0161                     17,2225  6 0000 1          DOUBLE
0162   REF  16 LAST 509  17,2226  6 0073 0          AD     RUPTREG4
0163   REF  17 LAST 523  17,2227  54 073 1          TS     RUPTREG4
0164   REF  130 LAST 521 17,2230  3 7767 0          CAF    ZERO
0165   REF  6 LAST 515   17,2231  6 7771 1          AD     NEGONE
0166   REF  22 LAST 523  17,2232  26 072 0          ADS    RUPTREG3

0167   REF  23 LAST 523  17,2233  3 0072 1          CA     RUPTREG3     SEE IF BURN HAS BEEN LONGER THAN
0168                     17,2234  0 0006 1          EXTEND              163.84 SECONDS.
0169   REF  1            17,2235  1 2247 0          BZF    17INSRTC     *LESS THAN 163.84 SECONDS*

0170                     17,2236  0 0006 1 17INSRTA EXTEND              *MORE THAN 163.84 SECONDS*
0171   REF  2 LAST 523   17,2237  3 1762 0          DCA    /TEMP5/
01711  REF  24 LAST 523  17,2240  52 073 1          DXCH   RUPTREG3     RESTORE RUPTREGS FOR ISWRETRN.

0172   REF  8 LAST 506   17,2241  3 7745 0 17INSRTF CAF    NEGMAX       SET TMINAPS NEGATIVE TO INACTIVATE
0173   REF  1            17,2242  55'763 0          TS     TMINAPS      THE ENGINOFF DELAY LOGIC

0174   REF  1            17,2243  3 1756 1 17INSRTB CA     /TEMP2/      RESTORE CALLERS EBANK.
0175   REF  34 LAST 480  17,2244  54 003 0          TS     EBANK
0176   REF  33 LAST 408  17,2245  0 5225 1          TC     POSTJUMP     RETURN TO THE ENGINOFF SEQUENCE.
0177   REF  2 LAST 101   17,2246  40264 0          CADR   ENGINOFF +1

0178   REF  18 LAST 523  17,2247  4 0073 1 17INSRTC CS     RUPTREG4     CHECK LENGTH OF BURN AGAINST TMINAPS.
0179   REF  2 LAST 523   17,2250  6 1763 1          AD     TMINAPS
0180                     17,2251  0 0006 1          EXTEND
0181   REF  1            17,2252  6 2236 1          BZMF   17INSRTA     BURN IS LONG ENOUGH - DO THE ENGINOFF.

0182   REF  70 LAST 490  17,2253  0 5663 1          TC     WAITLIST     SUSPEND CURRENT MISSION PHASE AND SET
0183   REF  3 LAST 523             E6               EBANK= TMINAPS      WAITLIST FOR RESUMPTION AT THE PROPER
01831                    17,2254  02236 1          2CADR  17INSRTA     TIME.
C01831 REF  2 LAST 523   17,2255  36066 1
01832  REF  55 LAST 453  17,2256  0 5727 0          TC     TASKOVER

01833  REF  3 LAST 522   17,2257  4 1075 0 17INSRTD CS     DVMNEXIT +1
01834  REF  2 LAST 522   17,2260  6 2267 0          AD     -ILLAVEG +1
01835                    17,2261  0 0006 1          EXTEND
01836  REF  1            17,2262  1 2241 0          BZF    17INSRTF     BBCONS MATCH - DO NOT DELAY
```

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```
 01837  REF   1                 17,2263  1 2215 1            TCF    17INSRTE

 0184   REF   6 LAST 177        17,2264    05221 0  SWRETADR GENADR SWRETURN

 0185                           17,2265    00071 1  MP3MMODE DCT    00071      MAJOR MODE OF MISSION PHASE 3.

 01852  REF  29 LAST 313                     E3               EBANK= LST1
 01854                          17,2266    02072 0  KILLAVEG 2CADR  AVEGKILL
C01854  REF   2 LAST 103        17,2267    16063 0
R01861  FOLLOWING CODING LEFT IN PLACE TO KEEP ADDRESSES CONSTANT.

R01962  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

 0214   REF  26 LAST 522        17,2270  0 4736 1  NOQUETS  TC     CCSHOLE    LABEL PREVENTS ASSEMBLER CUSSES.
 0215   REF   1                 17,2271  1 2413 1            TCF    XTRANS
 0216   REF   1                 17,2272  1 2365 1            TCF    R-,CHKDB
 0217   REF   2 LAST 524        17,2273  1 2413 1            TCF    XTRANS

 0218   REF   1                 17,2274  6 1501 1  NEGQERDR AD     -RATEDB
 0219                           17,2275  0 0006 1            EXTEND
 0220   REF   1                 17,2276  6 2270 0            BZMF   NOQJETS

 0221   REF   1                 17,2277  11'424 0            CCS    RRATEDIF
 0222   REF   1                 17,2300  1 2311 1            TCF    R+Q-CHKR
 0223   REF   1                 17,2301  1 2303 1            TCF    Q-NORJTS
 0224   REF   1                 17,2302  1 2316 0            TCF    R-Q-CHKR

 0225   REF   1                 17,2303  4 1423 1  Q-NORJTS CS     QRATEDIF
 0226   REF   1                 17,2304  55'437 1            TS     RATEDIF
 0227   REF   5 LAST 498        17,2305  6 1500 0            AD     -2JETLIM
 0228                           17,2306  0 0006 1            EXTEND
 0229   REF   1                 17,2307  6 3426 1            BZMF   2JETS+Q
 0230   REF   1                 17,2310  1 3424 1            TCF    4JETS+Q

 0231   REF   2 LAST 524        17,2311  6 1501 1  R+Q-CHKR AD     -RATEDB
 0232                           17,2312  0 0006 1            EXTEND
 0233   REF   2 LAST 524        17,2313  6 2303 0            BZMF   Q-NORJTS
 0234   REF   1                 17,2314  0 3515 0            TC     EDOTVGEN
 0235   REF   1                 17,2315  1 3344 0            TCF    2-V.RATE

 0236   REF   3 LAST 524        17,2316  6 1501 1  R-Q-CHKR AD     -RATEDB
 0237                           17,2317  0 0006 1            EXTEND
 0238   REF   3 LAST 524        17,2320  6 2303 0            BZMF   Q-NORJTS
 0239   REF   1                 17,2321  0 3511 1            TC     EDOTNGEN
 0240                           17,2322  0 0006 1            EXTEND
 0241   REF   2 LAST 524        17,2323  61'424 1            SU     RRATEDIF
 0242   REF   1                 17,2324  1 3373 1            TCF    2+J.RATE

 0243   REF   4 LAST 524        17,2325  6 1501 1  POSQERDR AD     -RATEDB
 0244                           17,2326  0 0006 1            EXTEND
```

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```
0245  REF   2 LAST 524    17,2327  6 2270 0          BZMF   NOQJETS

0246  REF   3 LAST 524    17,2330  11,424 0          CCS    RRATEDIF
0247  REF   1             17,2331  1 2342 1          TCF    R+Q+CHKR
0248  REF   1             17,2332  1 2334 0          TCF    Q+NORJTS
0249  REF   1             17,2333  1 2347 1          TCF    R-Q+CHKR

0250  REF   2 LAST 524    17,2334  3 1423 0  Q+NORJTS CA     QRATEDIF
0251  REF   2 LAST 524    17,2335  55,437 1          TS     RATEDIF
0252  REF   6 LAST 524    17,2336  6 1500 0          AD     -2JETLIM
0253                       17,2337  0 0006 1          EXTEND
0254  REF   1             17,2340  6 3265 0          BZMF   2JETS-Q
0255  REF   1             17,2341  1 3263 1          TCF    4JETS-Q

0256  REF   5 LAST 524    17,2342  6 1501 1  R+Q+CHKR AD     -RATEDB
0257                       17,2343  0 0006 1          EXTEND
0258  REF   2 LAST 525    17,2344  6 2334 1          BZMF   Q+NORJTS
0259  REF   2 LAST 524    17,2345  0 3511 1          TC     EDOTNGEN
0260  REF   1             17,2346  1 3243 0          TCF    2-J,RATE

0261  REF   6 LAST 525    17,2347  6 1501 1  R-Q+CHKR AD     -RATEDB
0262                       17,2350  0 0006 1          EXTEND
0263  REF   3 LAST 525    17,2351  6 2334 1          BZMF   Q+NORJTS
0264  REF   2 LAST 524    17,2352  0 3515 0          TC     EDOTVGEN
0265  REF   1             17,2353  1 3301 1          TCF    2+V,RATE

0266  REF   7 LAST 525    17,2354  6 1501 1  R+,CHKDB AD     -RATEDB
0267                       17,2355  0 0006 1          EXTEND
0268  REF   3 LAST 524    17,2356  6 2413 0          BZMF   XTRANS
0269  REF   4 LAST 525    17,2357  3 1424 1          CA     RRATEDIF
0270  REF   3 LAST 525    17,2360  55,437 1          TS     RATEDIF
0271  REF   7 LAST 525    17,2361  6 1500 0          AD     -2JETLIM
0272                       17,2362  0 0006 1          EXTEND
0273  REF   1             17,2363  6 3227 0          BZMF   2JETS-R
0274  REF   1             17,2364  1 3225 0          TCF    4JETS-R

0275  REF   8 LAST 525    17,2365  6 1501 1  R-,CHKDB AD     -RATEDB
0276                       17,2366  0 0006 1          EXTEND
0277  REF   4 LAST 525    17,2367  6 2413 0          BZMF   XTRANS
0278  REF   5 LAST 525    17,2370  4 1424 0          CS     RRATEDIF
0279  REF   4 LAST 525    17,2371  55,437 1          TS     RATEDIF
0280  REF   8 LAST 525    17,2372  6 1500 0          AD     -2JETLIM
0281                       17,2373  0 0006 1          EXTEND
0282  REF   1             17,2374  6 3412 0          BZMF   2JETS+R
0283  REF   1             17,2375  1 3410 0          TCF    4JETS+R

0284  REF   5 LAST 525    17,2376  11,437 1  RTJETIME CCS    RATEDIF        SCALED AT PI/4 RADIANS/SECOND
0285  REF 130 LAST 514    17,2377  6 7763 1          AD     ONE
0286                       17,2400  1 2402 1          TCF    +2
0287  REF 131 LAST 525    17,2401  6 7763 1          AD     ONE            ABS(RATEDIF)
```

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```
0288                          17,2402  0 0006 1   EXTEND
0289  REF   1                 17,2403  7 0066 0   MP      1/VJETAC      SCALED AT 2(8)/PI SECOND(2)/RADIANS
0290                          17,2404  0 0006 1   EXTEND
0291  REF  31 LAST 493        17,2405  7 7760 0   MP      BIT4          SCALED AT 2(3) SECONDS
0292  REF  99 LAST 519        17,2406  30 001 0   CAE     L
0293                          17,2407  0 0006 1   EXTEND
0294  REF   1                 17,2410  7 2557 0   MP      25/32,QR      TJET NOW PROPERLY SCALED IN A
0295  REF   2 LAST 488        17,2411  55'612 1   TS      TQR           AT 2(4)16/25 SECONDS
0296  REF   1                 17,2412  1 2457 1   TCF     MNIMPTST
```

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P0297 DAP SECTION: XTRANS MOD. NO. 3 DATE: JANUARY 6, 1967.

R0298 AUTHOR: JOHN S. BLISS (ADAMS ASSOCIATES)

R0299 MODIFICATION BY: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0300 X-AXIS TRANSLATION LOGIC (IN THE ABSENSE OF Q,R-AXIS ROTATION) IS INITIATED IN THE "XTRANS" SECTION.

R0302 XTRANS FIRST SETS ADDTLT6 AND ADDT6JTS TO ZERO FOR USE BY "JTLST" AND "T6JOB" WHEN THEY ARE CALLED. IT THEN
R0304 CHECKS FOR PLUS OR MINUS X TRANSLATION REQUESTS FROM THE ASTRONAUT'S STICK. IF NONE IS REQUESTED IN THAT WAY,
R0306 THE ULLAGE BIT OF DAPBOOLS IS CHECKED. (NOTE THAT THE ORDER OF THE TESTS ALLOWS THE ASTRONAUT TO OVERRIDE THE
R0308 INTERVAL ULLAGE REQUEST.) IF NO TRANSLATION IS REQUESTED, ALL Q,R-AXIS JETS ARE TURNED OFF AND THE INTERRUPT
R0310 IS TERMINATED.

R0311 CALLING SEQUENCE: NONE SUBROUTINES CALLED: WRITEQR

R0312 NORMAL EXIT: 1. IF NO TRANSLATION, RESUME.
R0313 2. IF TRANSLATION OR ULLAGE, +/-XTRAN

R0314 ALARM/ABORT MODE: NONE.

R0315 INPUT: ULLAGER/DAPBOOLS,BIT7,8/CHANNEL 31.

R0316 OUTPUT: C(ANYTRANS) = NEGMAX FOR +X TRANSLATION.
R0317 C(ANYTRANS) = POSMAX FOR -X TRANSLATION.
R0318 C(TRANSNOW) = C(TRANSAVE) = +0.
R0319 C(TRANONLY) = PNZ
R0320 C(ADDTLT6), C(ADDT6JTS), C(TQR), C(TOFJTCHG) = 0.

R0321 C(CHANNEL 5) = 0 IF NO X-TRANSLATION REQUESTED

R0322 DEBRIS: A, L, Q

```
0323  REF 181 LAST 523    17,2413  3 7767 0  XTRANS  CAF    ZERO       PICK UP ZERO AND INITIALIZE
0324  REF   7 LAST 514    17,2414  55,474 0          TS     ADDTLT6
0325  REF   6 LAST 514    17,2415  55,473 1          TS     ADDT6JTS
0326  REF  15 LAST 514    17,2416  55,475 1          TS     TOFJTCHG
0327  REF   3 LAST 526    17,2417  55,612 1          TS     TQR        A ZERO OF JET TIME FOR THE TORQUE VECTOR

0328  REF  28 LAST 474    17,2420  3 7755 1          CAF    BIT7       IS PLUS X TRANSLATION DESIRED
0329                      17,2421  0 0006 1          EXTEND
0330                      17,2422  02 031 1          RAND   31         CHANNEL 31 BITS INVERTED
0331                      17,2423  0 0006 1          EXTEND
0332  REF   1             17,2424  1 2441 0          BZF    +XQRULGE   YES, +X

0333  REF  16 LAST 474    17,2425  3 7754 0          CAF    BIT8       NO, IS MINUS X TRANSLATION DESIRED
0334                      17,2426  0 0006 1          EXTEND
0335                      17,2427  02 031 1          RAND   31         CHANNEL 31 BITS INVERTED
```

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```
0336                        17,2430  0 0006 1          EXTEND
0337  REF   1              17,2431  1 2443 1          BZF    -XTRANS       YES, -X

0338  REF  33 LAST 487     17,2432  3 7756 1          CAF    BIT6          NO, IS ULLAGE(+X TRANSLATION) DESIRED
0339  REF  40 LAST 521     17,2433  7 0077 0          MASK   DAPBOOLS
0340  REF 242 LAST 514     17,2434  10 000 0          CCS    A
0341  REF   2 LAST 527     17,2435  1 2441 0          TCF    +XORULGE      YES, ULLAGE

0342  REF 182 LAST 527     17,2436  3 7767 0          CAF    ZERO          SINCE NEITHER ROTATION NOR TRANSLATION
0343  REF   2 LAST 486     17,2437  0 6046 0          TC     WRITEQR       ARE NEEDED, TURN OFF ALL Q,R-AXES JETS.
0344  REF  32 LAST 515     17,2440  1 5733 1          TCF    RESJME

0345  REF   9 LAST 523     17,2441  3 7745 0 +XORULGE CAF    NEGMAX        PLUS TRANSLATION OR ULLAGE DESIRED:
0346                        17,2442  1 2444 0          TCF    +2            LOAD NEGMAX IN A AND SKIP NEXT OPCODE TO

0347  REF  27 LAST 507     17,2443  3 7743 0 -XTRANS  CAF    POSMAX        -X TRANSLATION DESIRED, A = POSMAX, AND
0348  REF   1              17,2444  54 071 0          TS     ANYTRANS      LOAD ANYTRANS WITH A(NEG/POS MAX)

0349  REF 183 LAST 528     17,2445  3 7767 0          CAF    ZERO          INITIALIZE TRANSNOW AND TRANSAVE WITH
0350  REF   1              17,2446  54 072 0          TS     TRANSNOW      ZERO FOR USE IN THE JET POLICY SELECTION
0351  REF   1              17,2447  54 073 1          TS     TRANSAVE      PROGRAM.

0352                        17,2450  0 0006 1          EXTEND                SET UP 2CADR FOR TRANSFER TO +/-XTRAN,
0353  REF   1              17,2451  3 2455 1          DCA    JTPOLADR
0354  REF   1              17,2452  54 070 1          TS     TRANONLY      STORE POSITIVE, NON-ZERO S-REGISTER IN
0355                        17,2453  52 006 0          DTCB                 TRANONLY.  AFTER +/-XTRAN, GO TO JTLST.

0356  REF   2 LAST 502                    E6          EBANK= JTSONNOW
0357                        17,2454  02447 1 JTPOLADR 2CADR  +/-XTRAN       TRANSLATION ONLY ENTRY TO JET POLICY
C0357 REF   1              17,2455  40066 0
```

L Q,R-AXES REACTION CONTROL SYSTEM AUTOPILOT USER'S OWN PAGE NO. 11 S3 E6

P0358 ALL Q,R AXES TQR COMPUTATIONS TERMINATE IN THIS PROGRAM WHICH PERFORMS A SERIES OF TESTS TO DETERMINE THE TRUE
R0360 TIME THE JETS SHOULD BE ON. THESE TESTS ARE AS FOLLOWS ...

R0361 1. TEST THE ON TIME AGAINST THE 7.5 MS ELECTRICAL COMMAND (MIN).IF THE ON TIME IS LESS THAN THE MINIMUM
R0363 WE BUG OUT TO XTRAN,WHERE X TRANSLATION IS DONE(IF NEEDED).

R0364 2. TEST THE ON TIME AGAINST 150 MS. IF TQR IS GREATER THAN 150MS ,THEN THE NEXT QR AXIS IS DONE IN 100 MS.
R0366 IF TQR IS LESS THAN 150 MS, THEN THE NEXT QR AXIS IS DONE IN 200 MS. THAT IS A QR AXIS SKIP IS DONE.

R0368 3. WHEN TQR IS LESS THAN 150 MS THE PROGRAM GOES TO THE JET LIST PROGRAM WHERE THE T6 CLOCK IS SET UP.

R0370 4. BEFORE GOING TO THE JET LIST THE COMPUTED TIME HAS EITHER 7.5 MS ADDED OR 5MS SUBTRACTED.THE EXACT
R0372 OPERATION BEING DECIDED BY WHETHER THE JETS WHICH ARE TO GO ON ARE OFF OR ARE ON RESPECTIVELY.

R0374 5. IF SOME OF THE JETS WHICH ARE TO GO ON ARE NOW ON AND SOME ARE OFF, THEN A ******* COMPUTATION CALLED
R0376 NOTRANS DECIDES WHICH JETS GO OFF AT TQR AND WHICH GO OFF AT TQR+6.5MS. THIS 6.5 MS. IS STORED IN
R0378 ADDTLT6. ADDTLT6 IS SET TO ZERO OTHERWISE.

```
 0379  REF   4 LAST 527     17,2456  55'612 1  NORMREIN IS    TQR

 0380  REF   5 LAST 529     17,2457  4 1612 1  MNIMPTST CS    TQR          TEST FOR TQR GREATER THAN MIN. IMPULSE.
 0381  REF   1              17,2460  6 2556 0            AD    +T6T.JMIN
 0382                       17,2461  0 0006 1            EXTEND               CORRECT BRANCH.
 0383  REF   1              17,2462  6 2464 0            BZMF  TQRGTTMI     BRANCH FOR TQR = OR GREATER THAN MINIMP.
 0384  REF   5 LAST 525     17,2463  1 2413 1            TCF   XTRANS       SEE IF TRANSLATION IS DESIRED .
 0385  REF   6 LAST 529     17,2464  31'612 0  TQRGTTMI CAE   TQR          HERE JETS ON FOR LONGER THAN GRJMANN
 0386  REF  16 LAST 527     17,2465  55'475 1            TS    TOFJTCHG     MINIMUM IMPULSE SPECIFICATIONS.
 0387  REF   1              17,2466  6 2555 0            AD    -1.5CSP
 0388                       17,2467  0 0006 1            EXTEND
 0389  REF   1              17,2470  6 2475 0            BZMF  DOQRSKIP
 0390  REF   3 LAST 528     17,2471  31'471 1            CAE   JTSONNOW
 0391  REF   3 LAST 528     17,2472  0 6046 0            TC    WRITEQR
 0392  REF  33 LAST 528     17,2473  1 5733 1            TCF   RESJME

 0393  REF   1              17,2474   02102 0  SKIPQRAD GENADR SKIPQRAX
R0394  CHANGE JET ON AND OFF BITS TO ACCOUNT FOR THE PRESENT STATE OF THE
R0395    CHANNEL. THE CHANGES ACCOUNT FOR PURE ROTATION ONLY- NOT TRANSLATION.
 0396  REF   4 LAST 529     17,2475  3 1471 1  DOQRSKIP CA    JTSONNOW
 0397                       17,2476  0 0006 1            EXTEND
 0398                       17,2477  02 005 0            RAND  5              MASK THE CHANNEL WITH THE DESIRED STATE.
 0399                       17,2500  0 0006 1  FROMROOT  EXTEND              ENTER HERE FROM DORUTDUM (IN K.E. BANK)
 0400  REF   1              17,2501  1 2526 0            BZF   NOQRON         A IS ZERO IF NO JETS TO GO ON ARE ON.
 0401  REF  31 LAST 513     17,2502  6 7745 0            AD    BIT15          MAKE DIFFERENCE CORRESPOND TO A QR JET.
 0402                       17,2503  0 0006 1            EXTEND
 0403  REF   5 LAST 529     17,2504  61'471 1            SU    JTSONNOW       RESULT IS COMPLEMENT OF JET BITS WHICH
 0404  REF 100 LAST 526     17,2505  54 001 1            TS    L                ARE TO BE ON FOR 6.5MS MORE THAN CALC.
 0405                       17,2506  0 0006 1            EXTEND
 0406  REF   1              17,2507  1 2531 0            BZF   JTSAREON       A=0,THUS ALL JETS TO GO ON ARE NOW ON.
```

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```
0407  REF   8 LAST 514    17,2510  31'472 1  TRSLIMN2  CAE    JTSATCHG
0408  REF  28 LAST 528    17,2511  7 7743 1            MASK   POSMAX        REMOVE BIT15 FROM JTSATCHG.
0409                      17,2512  0 0006 1            EXTEND
0410  REF   1             17,2513  1 2517 1            BZF    NOTRANS       IF JTSATCHG = 0 THEN NO TRANSLATION NOW.
0411  REF   1             17,2514  3 2566 0            CA     14-TORMN
0412  REF  17 LAST 529    17,2515  27'475 1            ADS    TOFJTCHG      INSURE T GREATER THAN 14 MS.
0413  REF   1             17,2516  1 2544 1            TCF    TOJTLST
0414  REF 101 LAST 529    17,2517  4 0001 1  NOTRANS   CS     L
0415  REF  32 LAST 529    17,2520  6 7745 0            AD     BIT15         MAKE JET BITS CORRESPOND TO QR AXIS.
0416  REF   9 LAST 530    17,2521  57'472 1            XCH    JTSATCHG      JTSONNOW = L = JETS ON AT TOFJTCHG.
0417  REF   7 LAST 527    17,2522  55'473 1            TS     ADDTI6JTS     JTS ON AT TOFJTCHG +ONDELAY.
0418  REF   2 LAST 530    17,2523  3 2566 0            CA     14-TORMN
0419  REF   8 LAST 527    17,2524  55'474 0            TS     ADDTIT6
0420  REF   2 LAST 530    17,2525  1 2544 1            TCF    TOJTLST
0421  REF   3 LAST 530    17,2526  3 2566 0  NOQRON    CA     14-TORMN
0422  REF  18 LAST 530    17,2527  27'475 1            ADS    TOFJTCHG
0425  REF   3 LAST 530    17,2530  1 2542 1            TCF    TOJTIST -2
0426  REF  10 LAST 530    17,2531  31'472 1  JTSAREON  CAE    JTSATCHG
0427  REF  29 LAST 530    17,2532  7 7743 1            MASK   POSMAX
0428                      17,2533  0 0006 1            EXTEND
0429                      17,2534  1 2536 1            BZF    +2
0430  REF   4 LAST 530    17,2535  1 2542 1            TCF    TOJTIST -2
0431  REF   1             17,2536  3 2565 0            CAF    MCOMPTOR
0432  REF  19 LAST 530    17,2537  27'475 1            ADS    TOFJTCHG
04325                     17,2540  0 0006 1            EXTEND                TEST FOR COMPUTATION OF NEGATIVE OR ZERO
04326 REF   1             17,2541  6 2553 0            BZMF   QUICKOFF      TOFJTCHG, IF SO, MAKE -0.
0433  REF 184 LAST 528    17,2542  3 7767 0  -2        CAF    ZERO
0434  REF   9 LAST 530    17,2543  55'474 0            TS     ADDTIT6
0435  REF   1             17,2544  3 2474 1  TOJTLST   CA     SKIPORAD
0436  REF   3 LAST 521    17,2545  55'653 1            TS     QJUMPADR
0437  REF   6 LAST 529    17,2546  31'471 1            CAE    JTSONNOW      TURN ON JETS TO GO ON NOW (EVEN IF ALL
0438  REF   4 LAST 529    17,2547  0 6046 0            TC     WRITEQR       ARE ALREADY ON), AFTER TESTING FOR RISE.
0439                      17,2550  0 0006 1            EXTEND
0440  REF   1             17,2551  3 2606 0            DCA    JTLSTADR
0441                      17,2552  52 006 0            DTCB

04411 REF  20 LAST 530    17,2553  4 1475 1  QUICKOFF  CS     TOFJTCHG      SET TOFJTCHG TO -0 IN SHORTEST WAY.
04412 REF   2 LAST 529    17,2554  1 2527 1            TCF    NOQRON +1

0442                      17,2555  77417 0  -1.5CSP   DEC    -0.01465
0443                      17,2556  00014 1  +T6TJMIN  DEC    +.00073
0444                      17,2557  31000 0  25/32.QR  DEC    0.78125
0445                      17,2560  37776 0  MS20QR    OCTAL  37776
0446                      17,2561  37775 0  MS30QR    OCTAL  37775
0447                      17,2562  37773 0  MS50QR    OCTAL  37773
0448                      17,2563  00010 0  16/32400  DEC    0.00049
0449                      17,2564  00600 1  BIT8,9    OCTAL  00600
0450                      17,2565  77757 1  MCOMPTOR  DEC    -16           -10 MS SCALED AS TIME6.
0451                      17,2566  00013 0  14-TORMN  DEC    11
R04515  START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********
```

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```
 0452   REF  27 LAST 524      17,2567  0 4736 1  MINTADR  IC      CCSHOLE
R04525  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

 0453                         17,2570  43415 0  -.88975  2DEC    -.88975
 0454                         17,2571  20000 0  (1-K),QR  2DEC    0.50000      K = 1/2
 0455                         17,2572  02000 0  (1-KQ)/8  2DEC    0.06250
 0456                         17,2573  77557 0  -90MS     2DEC    -.00879
 0457                         17,2574  00220 1  +90MS     2DEC    0.00879
 0458                         17,2575  77537 0  NEGCSP2   2DEC    -.00977
 0459                         17,2576  40252 0  ALL+XJTS  2OCTAL  40252
 0460                         17,2577  00201 1  2,10-OJT  2OCTAL  00201
 0461                         17,2600  40042 0  +X,A      2OCTAL  40042
 0462                         17,2601  40210 0  +X,B      2OCTAL  40210
 0463                         17,2602  00104 1  1,9-OUT   2OCTAL  00104
 0464                         17,2603  40104 0  -X,A      2OCTAL  40104
 0465                         17,2604  40021 0  -X,B      2OCTAL  40021
 0466   REF   7 LAST 530                    E6           2BANK=  JTS2NNOW
 0467                         17,2605  03402 1  JTLSTADR  2CADR   JTLST
C0467   REF   2 LAST 512      17,2606  34066 0
 0468   REF   1               17,2607  02376 1  RTJETADR  GENADR  RTJETIME
```

L Q-R-AXES REACTION CONTROL SYSTEM AUTOPILOT USER'S OWN PAGE NO. 14 S3 E6

P0469 Q-R-AXES ATTITUDE STEERING CALCULATIONS:

R0470 (EXECUTED WHEN LGC IS IN AUTOMATIC SCSMODE OR IF SCSMODE IS ATTITUDE HOLD AND THE ROTATIONAL HAND CONTROLLER IS
R0472 NEITHER OUT OF DETENT NOR IS THE RATE COMMAND BIT SET IN DAPBOOLS)

```
0481                        17,2610  0 0006 1  CHKGIMBL EXTEND
0482  REF   1              17,2611  3 2617 0           DCA     TRYGTSAD        TRYGTS ATTEMPTS GTS CONTROL.
0483  REF  15 LAST 295     17,2612  52 006 0           DXCH    Z
0484  REF  28 LAST 531     17,2613  0 4736 1           TC      CCSHOLE

0485                        17,2614    07400 1  BSIM24   OCTAL   07400
0486  REF   2 LAST 515     17,2615    03533 1  DESCADR  GENADR  TJETLAW

0487  REF  11 LAST 521                 E6               EBANK=  DT
0488                        17,2616    03573 0  TRYGTSAD 2CADR   TRYGTS          TRYGTS ATTEMPTS GTS CONTROL.
C0488 REF   1               17,2617    42066 1
```

```
L       Q-R-AXES REACTION CONTROL SYSTEM AUTOPILOT                      USER'S OWN PAGE NO.  15          S3  E6

P0489   "ATTSTEER" IS THE NOMINAL ENTRY POINT FOR REACTION CONTROL SYSTEM ATTITUDE STEERING

 0491   REF   I                    17,2620  ATTSTEER EQUALS QERRCALC
 0492   REF  19 LAST 519  17,2620  30 033 1 QERRCALC CAE    CDUY          Q-ERROR CALCULATION
 0493                     17,2621  0 0006 1          EXTEND
 0494   REF   5 LAST 503  17,2622  20 767 0          MSU    CDUYD         CDU ANGLE - ANGLE DESIRED (Y-AXIS)
 0495   REF  58 LAST 520  17,2623  54 061 1          TS     ITEMP1        SAVE FOR RERRCALC
 0496                     17,2624  0 0006 1          EXTEND
 0497   REF   3 LAST 520  17,2625  7 1405 0          MP     M21           (CDUY-CDUYD)*M21 SCALED AT PI RADIANS
 0498   REF   3 LAST  49  17,2626  57'413 0          XCH    ER            SAVE FIRST TERM (OF TWO) IN OPP.AXIS REG
 0499   REF  13 LAST 519  17,2627  30 034 0          CAE    CDUZ          SECOND TERM CALCULATION:
 0500                     17,2630  0 0006 1          EXTEND
 0501   REF   2 LAST 223  17,2631  20 770 0          MSU    CDUZD         CDU ANGLE -ANGLE DESIRED (Z-AXIS)
 0502   REF  32 LAST 520  17,2632  54 062 1          TS     ITEMP2        SAVE FOR RERRCALC
 0503                     17,2633  0 0006 1          EXTEND
 0504   REF   5 LAST 520  17,2634  7 1401 1          MP     M22           (CDUZ-CDUZD)*M22 SCALED AT PI RADIANS
 0505   REF   4 LAST 533  17,2635  27'413 1          ADS    ER            SAVE SUM OF TERMS, NO OVERFLOW EVER
 0506   REF   4 LAST 518  17,2636  55'467 1          TS     QERROR        SAVE QERROR FOR EIGHT-BALL DISPLAY

 0507   REF  59 LAST 533  17,2637  30 061 0 RERRCALC CAE    ITEMP1        R-ERROR CALCULATION:
 0508                     17,2640  0 0006 1          EXTEND                CDU ANGLE -ANGLE DESIRED (Y-AXIS)
 0509   REF   3 LAST 520  17,2641  7 1406 0          MP     M31           (CDUY-CDUYD)*M31 SCALED AT PI RADIANS
 0510   REF  15 LAST 507  17,2642  57'411 1          XCH    E             SAVE FIRST TERM (OF TWO) IN OPP.AXIS REG
 0511   REF  33 LAST 533  17,2643  30 062 0          CAE    ITEMP2        SECOND TERM CALCULATION:
 0512                     17,2644  0 0006 1          EXTEND                CDU ANGLE -ANGLE DESIRED (Z-AXIS)
 0513   REF   4 LAST 520  17,2645  7 1403 0          MP     M32           (CDUZ-CDUZD)*M32 SCALED AT PI RADIANS
 0514   REF  16 LAST 533  17,2646  27'411 0          ADS    E             SAVE SUM OF TERMS, NO OVERFLOW EVER
 0515   REF   3 LAST 488  17,2647  55'470 1          TS     RERROR        SAVE R-ERROR FOR EIGHT-BALL DISPLAY

05155   REF   1           17,2650  1 2715 1          TCF    STILLRCS

R0516   THIS CODING IS ENTERED FROM BURGZERO, WHEN BOTH URGENCIES ARE ZERO.  EXITS TO GTS IF POSSIBLE, XTRANS OTHERWISE

 0517   REF   5 LAST 521  17,2651  3 7762 0 GIMBLTRY CAF    JSEQRJTS      IS JET USAGE MANDATORY.
 0518   REF  41 LAST 528  17,2652  7 0077 0          MASK   DAPBOOLS
 0519   REF 243 LAST 528  17,2653  10 000 0          CCS    A
 0520   REF   6 LAST 529  17,2654  1 2413 1          TCF    XTRANS        YES.  GO TO XTRANS.

05201                     17,2655  0 0006 1          EXTEND                ARE GIMBALS DRIVING?
05203                     17,2656  00 012 1          READ   12
05205   REF   2 LAST 521  17,2657  7 2614 1          MASK   BGIM+4        BITS 9,10,11,12 ARE GIMBAL DRIVE BITS.
05207   REF 244 LAST 533  17,2660  10 000 0          CCS    A
05209   REF   7 LAST 533  17,2661  1 2413 1          TCF    XTRANS        YES.  DRIVING.  GO TO XTRANS.

 0522                     17,2662  0 0006 1          EXTEND                NO.  CHECK JETS.
 0523                     17,2663  00 005 1          READ   5             ARE ANY Q,R JETS ON NOW.
A05235                                                                   (CAN ONLY BE ROTATION JETS.)
 0524                     17,2664  0 0006 1          EXTEND
 0525   REF   8 LAST 533  17,2665  1 2413 1          BZF    XTRANS        NO.  GO TO XTRANS.
```

L Q-R-AXES REACTION CONTROL SYSTEM AUTOPILOT USER'S OWN PAGE NO. 16 S3 E6

```
 0527   REF 185 LAST 530     17,2666  3 7767 0          CAF    ZERO          YES.  TURN OFF JETS.
 0528                        17,2667  0 0006 1          EXTEND
 0529                        17,2670  01 005 0          WRITE  5

 0536                        17,2671  0 0006 1          EXTEND               NO.   GO TO GTS.
 0537   REF   1              17,2672  3 2675 1          DCA    GOGTSADR
 0538   REF  16 LAST 532     17,2673  52 006 0          DXCH   Z

 0539   REF  12 LAST 532                 E6             EBANK= DT
 0540                        17,2674   03604 0  GOGTSADR 2CADR  GOTOGTS
C0540   REF   2 LAST 521     17,2675   42066 1
R05405  REMAINING CODING (HERE TO STILLRCS) STAYS IN TO KEEP ADDRESSES CONSTANT.

 0542   REF  29 LAST 532     17,2676  0 4736 1          TC     CCSHOLE       FILLER.
 0543   REF   2 LAST 533     17,2677  1 2715 1          TCF    STILLRCS      NO.       SO USE RCS.
 0544   REF   6 LAST 492     17,2700  50 066 1          INDEX  QRCNTR        YES.      TRY THE ERROR MAGNITUDE.
 0545   REF   1              17,2701  11'467 1          CCS    QDIFF         IS ERROR SMALL ENOUGH FOR GTS.
 0546   REF   1              17,2702  6 2714 1          AD     -XBND+1       -1.4 DEG SCALED AT PI    + 1 BIT
 0547                        17,2703  1 2705 0          TCF    +2
 0548   REF   2 LAST 534     17,2704  6 2714 1          AD     -XBND+1
 0549                        17,2705  0 0006 1          EXTEND
 0550                        17,2706  6 2710 0          BZMF   +2            IS ERROR LESS.EQUAL 1.4 DEG.
 0551   REF   3 LAST 534     17,2707  1 2715 1          TCF    STILLRCS      NO.       USE RCS CONTROL.
 0552   REF   7 LAST 534     17,2710  10 066 0          CCS    QRCNTR        THIS AXIS IS FINE.   ARE BOTH DONE.
 0553   REF  30 LAST 534     17,2711  0 4736 1          TC     CCSHOLE       REMOVE REFERENCE TO ELIMINATED SYMBOL.
 0554   REF  31 LAST 534     17,2712  0 4736 1          TC     CCSHOLE       FILLER.
 0555                        17,2713   77512 1  -RATLM+1 OCT    77512         -.5 DEG/SEC SCALED AT PI/4  + 1 BIT
 0556                        17,2714   77601 0  -XBND+1  OCT    77601         -1.4 DEG SCALED AT PI, + 1 BIT.
R0557   "STILLRCS" IS THE ENTRY POINT TO RCS ATTITUDE STEERING WHENEVER IT IS FOUND THAT THE TRIM GIMBAL CONTROL
R0559   SYSTEM SHOULD NOT BE USED:
```

```
L       Q,R-AXES REACTION CONTROL SYSTEM AUTOPILOT                      USER'S OWN PAGE NO. 17          S3  E6

P0560   Q,R-AXES RCS URGENCY FUNCTION LOGIC:

 0561   REF  42 LAST 533    17,2715  10 077 0  STILLRCS CCS    DAPBOOLS    BRANCH TO SPS-BACKUP RCS CONTROL LOGIC,
 0562   REF   1             17,2716  1 3526 1          TCF    SPSBAKUP    WHEN BIT15/DAPBOOLS = 0,
 0563                       17,2717  1 2720 1          NOOP
 0564   REF   1             17,2720  3 2615 1          CAF    DESCADR     SET JET SELECT LOGIC RETURN ADDRESS TO
 0565   REF   1             17,2721  54 062 1          TS     TJETADR     THE Q,R-AXIS TJETLAW CALCULATION

 0566   REF   3 LAST 494    17,2722  0 6013 0          TC     T6JOBCHK    CHECK T6 CLOCK RUPT BEFORE SUBROUTINE

R0567   CALCULATE THE RATE ERRORS SCALED AT PI/4 RADIANS/SECOND(2):

 0568   REF   2 LAST 476    17,2723  4 0775 0          CS     OMEGAQD
 0569   REF   6 LAST 520    17,2724  6 1416 0          AD     OMEGAQ      EDOTQ = OMEGAQ - OMEGAQD
 0570   REF   2 LAST  49    17,2725  55'423 1          TS     EDOTQ

 0571   REF   4 LAST 476    17,2726  4 0776 0          CS     OMEGARD
 0572   REF   9 LAST 520    17,2727  6 1420 0          AD     OMEGAR      EDOTR = OMEGAR - OMEGARD
 0573   REF   2 LAST  49    17,2730  55'424 0          TS     EDOTR
```

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P0574 Q,R-AXES URGENCY FUNCTION LOOP:

R0575 SET JPI LOOP TO DO R-AXIS, THEN Q-AXIS:

```
0576  REF 132 LAST 525   17,2731  3 7763 1            CAF    ONE        1: REFERS TO R-AXIS VARIABLES.
0577  REF   1            17,2732  54 061 1            TS     AXISCNTR   0: REFERS TO Q-AXIS VARIABLES.
```

R0578 PICK JP EDOT AND RESCALE FROM PI/4 TO PI/16 RADIANS/SECOND:

```
0579  REF   2 LAST 536   17,2733  50 061 0  JRGLOOP   INDEX  AXISCNTR  ERROR RATES ARE PRE-CALCULATED BY RATE
0580  REF   3 LAST 535   17,2734  31'423 0            CAE    EDOTQ      DERIVATION SCALED AT PI/4 RADIANS/SECOND
0581                     17,2735  0 0006 1            EXTEND            MULTIPLYING BY FOUR (BIT3) LEAVES EDOT
0582  REF  17 LAST 502   17,2736  7 7761 1            MP     EDJR       AS C(L) IF EDOT LESS THAN 11.25 DEG/SEC.
0583                     17,2737  0 0006 1            EXTEND
0584                     17,2740  1 2742 0            BZF    +2         IF C(A) NON-ZERO, THEN EDOT GREATER THAN
0585  REF   1            17,2741  1 3010 1            TCF    EDOTMAX    11.25 DEG/SEC IN MAGNITUDE, SO LIMIT IT.

0586  REF 102 LAST 530   17,2742  10 001 1            CCS    L          INSURE NON-ZERO EDOT:
0587  REF  58 LAST 502   17,2743  6 7762 0            AD     TWO        C(L) PNZ REMAINS UNCHANGED.
0588                     17,2744  1 2746 1            TCF    +2         C(L) NNZ REMAINS UNCHANGED.
0589                     17,2745  4 0000 0            COM               C(L)  +0 BECOMES 77776.
0590  REF   3 LAST 308   17,2746  6 7771 1            AD     NEG1       C(L)  -0 BECOMES 77776.
0591  REF  11 LAST 509   17,2747  55'407 1  EDOTSTOR  TS     EDOT       SAVE NON-ZERO EDOT SCALED AT PI/16.

0592                     17,2750  0 0006 1            EXTEND            CALCULATE (EDOT)(EDOT):
0593                     17,2751  7 0000 0            SQUARE
0594  REF   6 LAST 507   17,2752  55'412 0            TS     EDOT(2)    SCALED AT PI(2)/2(+8) RAD(2)/SEC(2).

0595                     17,2753  0 0006 1            EXTEND              0.5          +8          2
0596  REF   3 LAST 536   17,2754  5 0061 0            INDEX  AXISCNTR    ------ SCALED AT 2  /PI SEC /RAD.
0597  REF   2 LAST  55   17,2755  7 1717 0            MP     1/ACCQ      ACCQ,R
0598                     17,2756  0 0006 1            EXTEND             DEADBAND = 5.0 OR 1.0 OR 0.3 DEGREES
0599  REF   7 LAST 515   17,2757  60 375 0            SU     DB          SCALED AT PI RADIANS.
0600  REF   1            17,2760  55'441 0            TS     FPQR       0.5(1/ACC)EDOT(2)-DB SCALED AT PI RADS.

0601  REF   7 LAST 536   17,2761  31'412 1            CAE    EDOT(2)    SCALED AT PI(2)/2(8) RAD(2)/SEC(2).
0602                     17,2762  0 0006 1            EXTEND
0603  REF   4 LAST 536   17,2763  5 0061 0            INDEX  AXISCNTR
0604  REF   3 LAST 478   17,2764  7 1721 0            MP     1/AMINQ     .5(1/ACCMIN) AT 2(8)/PI SEC(2)/RAD.
0605  REF   8 LAST 536   17,2765  6 0375 0            AD     DB          DEADBAND SCALED AT PI RADIANS.
0606  REF   1            17,2766  55'460 0            TS     FPQRMIN    .5(1/ACCMIN)EDOT(2)+DB SCALED AT PI RAD.

0607  REF  12 LAST 536   17,2767  11'407 1            CCS    EDOT       EDOT TEST ON SIGN (NON-ZERO):
0608  REF  17 LAST 533   17,2770  31'411 1            CAE    E          ATTITUDE ERROR FOR THIS AXIS
0609                     17,2771  1 2773 1            TCF    +2         SCALED AT PI RADIANS.
0610  REF   1            17,2772  1 3015 1            TCF    EDOTNEG
0611  REF   2 LAST 536   17,2773  27'441 0            ADS    FPQR       E+0.5(1/ACC)EDOT(2)-DB SCALED AT PI RAD.

0612  REF  13 LAST 536   17,2774  11'407 1  FTEST     CCS    EDOT       EDOT GUARANTEED NOT +0 OR -0.
0613  REF   3 LAST 536   17,2775  11'441 0            CCS    FPQR       FPQR GUARANTEED NOT +0.
```

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0614  REF   1            17,2776  1 3003 0          TCF    QUICKURG     EDOT.G.+0, FPQR.G.+0.
0615  REF   4 LAST 536    17,2777  11'441 0         CCS    FPQR         EDOT.L.-0.
0616  REF   1            17,3000  1 3021 0         TCF    FMINCALC     EDOT.L.-0,FPQR.G.+0/EDOT.G.+0,FPQR.L.-0.
0617  REF   2 LAST 537    17,3001  1 3021 0         TCF    FMINCALC     EDOT.G.+0,FPQR.E.-0 (FROM FIRST CCS).
0618  REF   2 LAST 537    17,3002  1 3003 0         TCF    QUICKURG     EDOT.L.-0,FPQR.L.-0.

0619  REF  14 LAST 536    17,3003  31'407 0  QUICKURG CAE    EDOT         EDOT.L.-0,FPQR.E.-0 (FROM 2ND CCS).
0620                      17,3004  0 0006 1         EXTEND               SCALE FROM PI/16 TO PI RADIANS/SECOND
0621  REF  29 LAST 516    17,3005  7 7751 1         MP     BIT11         TO HAVE SAME SCALING AS FPQR AFTER THE
0622  REF   5 LAST 537    17,3006  6 1441 1         AD     FPQR          IMPLICIT MULT. OF FPQR BY 1/SEC.
0623  REF   1            17,3007  1 3043 1         TCF    JRGMULT      THIS URGENCY = (1/ACC)(FPQR+EDOT).

0624  REF 245 LAST 533    17,3010  10 000 0  EDOTMAX  CCS    A            GUARANTEED NOT +0 OR -0.
0625  REF  30 LAST 530    17,3011  3 7743 0         CAF    POSMAX
0626  REF   1            17,3012  1 2747 0         TCF    EDOTSTOR     SET EDOT TO SIGNED MAXIMUM.
0627  REF  31 LAST 537    17,3013  4 7743 1         CS     POSMAX
0628  REF   2 LAST 537    17,3014  1 2747 0         TCF    EDOTSTOR     SCALED AT PI/16 RADIANS/SECOND.

0629  REF   6 LAST 537    17,3015  4 1441 0  EDOTNES  CS     FPQR         SCALED AT PI RADIANS
0630  REF  18 LAST 536    17,3016  6 1411 1         AD     E            ATTITUDE ERROR FOR THIS AXIS
0631  REF   7 LAST 537    17,3017  55'441 0         TS     FPQR         E-0.5(1/ACC)EDOT(2)+DB SCALED AT PI RAD.
0632  REF   1            17,3020  1 2774 0         TCF    FTEST

0633  REF   8 LAST 537    17,3021  11'441 0  FMINCALC CCS    FPQR         NECESSARY RETEST ON FPQR:
0634  REF   2 LAST 536    17,3022  4 1460 0         CS     FPQRMIN
0635                      17,3023  1 3025 1         TCF    +2           E-0.5(1/ACCMIN)EDOT(2)-DB
0636  REF   3 LAST 537    17,3024  31'460 1         CAE    FPQRMIN
0637  REF  19 LAST 537    17,3025  6 1411 1         AD     E            E+0.5(1/ACCMIN)EDOT(2)+DB
0638  REF   4 LAST 537    17,3026  55'460 0         TS     FPQRMIN      SCALED AT PI RADIANS.

0639  REF  15 LAST 537    17,3027  11'407 1         CCS    EDOT         EDOT   GUARANTEED NOT +0 OR -0.
0640  REF   5 LAST 537    17,3030  11'460 0         CCS    FPQRMIN      FPQRMIN GUARANTEED NOT +0 (CALL IT F).
0641  REF   1            17,3031  1 3036 0         TCF    ZEROURG      EDOT.G.+0, F.G.+0.
0642  REF   6 LAST 537    17,3032  11'460 0         CCS    FPQRMIN      EDOT.L.-0.
0643  REF   1            17,3033  1 3042 0         TCF    NORMURG      EDOT.L.-0, F.G.+0 / EDOT.G.+0, F.L.-0.
0644  REF   2 LAST 537    17,3034  1 3042 0         TCF    NORMURG      EDOT.G.+0, F.E.-0 (FROM FIRST CCS).
0645  REF   2 LAST 537    17,3035  1 3036 0         TCF    ZEROURG      EDOT.L.-0, F.L.-0.
0646                      17,3036  0 0006 1  ZEROURG  EXTEND             EDOT.L.-0, F.E.-0 (FROM 2ND CCS).
0647  REF   1            17,3037  3 3117 0         DCA    DPZERO       THIS URGENCY IS ZERO.
0648  REF   1            17,3040  53'503 1         DXCH   JRGENCYQ
0649  REF   1            17,3041  1 3047 0         TCF    MOREURG      TEST FOR NEXT AXIS

0650  REF   7 LAST 537    17,3042  31'460 1  NORMURG  CAE    FPQRMIN      THIS URGENCY IS FPQRMIN(1/ACC).
0651                      17,3043  0 0006 1  JRGMULT  EXTEND
0652  REF   5 LAST 536    17,3044  5 0061 0         INDEX  AXISCNTR
0653  REF   3 LAST 536    17,3045  7 1717 0         MP     1/ACCQ
0654  REF   2 LAST 537    17,3046  53'503 1         DXCH   JRGENCYQ     SAVE D.P. SCALED AT 2(+9).

0655  REF   6 LAST 537    17,3047  10 061 1  MOREURG  CCS    AXISCNTR     TEST FOR END OF LOOP
0656                      17,3050  1 3052 1         TCF    +2           CONTINUE.
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0657  REF   1              17,3051  1 3120 0          TCF    JRGSCALQ        FINISHED.

0658  REF   7 LAST 537     17,3052  54 061 1          TS     AXISCNTR        Q-AXIS

0659                       17,3053  0 0006 1          EXTEND
0660  REF   3 LAST 537     17,3054  3 1503 0          DCA    JRGENCYQ        SET URGENCYR
0661  REF   1              17,3055  53,505 1          DXCH   JRGENCYR

0662  REF  20 LAST 537     17,3056  53,412 0          DXCH   E               SET ER,EDOT(2)R
0663  REF   5 LAST 533     17,3057  53,414 0          DXCH   ER
0664  REF   1              17,3060  55,411 0          TS     EQ              SET EQ
0665  REF  16 LAST 537     17,3061  31,407 0          CAE    EDOT
0666  REF   1              17,3062  55,410 1          TS     EDOT,R)         SET EDOT(R).

0667  REF   1              17,3063  1 2733 0          TCF    JRGLOOP         CONTINUE.

R0668 SUFFICIENT TEST FOR JRGENCY RESCALING:

0669  REF   2 LAST 538     17,3064  11,504 0 JRGSCALR CCS    JRGENCYR        IF ABVAL(URGENCYR) LESS THAN SCALE BOUND
0670  REF   1              17,3065  6 3115 1          AD     SCALEBND
0671                       17,3066  1 3070 1          TCF    +2              THEN BOTH URGENCIES CAN BE RESCALED FROM
0672  REF   2 LAST 538     17,3067  6 3115 1          AD     SCALEBND
0673                       17,3070  0 0006 1          EXTEND                 2(+9) TO 2(+4) SECONDS.
0674  REF   1              17,3071  6 3073 0          BZMF   JRGSCALE
0675  REF   1              17,3072  1 3126 0          TCF    JRGLIMS

R0676 RESCALE BOTH URGENCIES FROM 2(+9) TO 2(+4) SECONDS:

0677  REF   4 LAST 538     17,3073  31,502 1 JRGSCALE CAE    JRGENCYQ        SHIFT D.P. URGENCYQ LEFT 5-PLACES TO
0678                       17,3074  0 0006 1          EXTEND                 FORM S.P. URGENCYQ NOW SCALED AT 16 SECS
0679  REF  34 LAST 528     17,3075  7 7756 0          MP     BIT6
0680  REF   5 LAST 538     17,3076  23,502 1          LXCH   JRGENCYQ
0681  REF   6 LAST 538     17,3077  31,503 0          CAE    JRGENCYQ +1
0682                       17,3100  0 0006 1          EXTEND
0683  REF  35 LAST 538     17,3101  7 7756 0          MP     BIT6
0684  REF   7 LAST 538     17,3102  27,502 0          ADS    JRGENCYQ

0685  REF   3 LAST 538     17,3103  31,504 1          CAE    JRGENCYR        SHIFT D.P. URGENCYR LEFT 5-PLACES TO
0686                       17,3104  0 0006 1          EXTEND                 FORM S.P. URGENCYR NOW SCALED AT 16 SECS
0687  REF  36 LAST 538     17,3105  7 7756 0          MP     BIT6
0688  REF   4 LAST 538     17,3106  23,504 1          LXCH   JRGENCYR
0689  REF   5 LAST 538     17,3107  31,505 0          CAE    JRGENCYR +1
0690                       17,3110  0 0006 1          EXTEND
0691  REF  37 LAST 538     17,3111  7 7756 0          MP     BIT6
0692  REF   6 LAST 538     17,3112  27,504 0          ADS    JRGENCYR

0693  REF   1              17,3113  31,477 1          CAE    JRGLM2          SET URGENCY LIMIT FOR 2(+4) SCALING.
0694  REF   1              17,3114  1 3127 1          TCF    JRGFUDGE

0695                       17,3115   77400 0 SCALEBND OCTAL  77400            -8 SECONDS SCALED AT 2(+9).
```

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 0696                          17,3116  00000 1  DPZERDY  2DEC   0
C0696                          17,3117  00000 1
R0697  NECESSARY TEST FOR URGENCY RESCALING:

 0698  REF   8 LAST 538        17,3120  11'502 0  JRGSCALQ CCS    JRGENCYQ     IF ABVAL(URGENCYQ) LESS THAN SCALE BOUND
 0699  REF   3 LAST 538        17,3121  6 3115 1           AD     SCALEBND
 0700                          17,3122  1 3124 1           TCF    +2           THEN TEST URGENCYR FOR RESCALABLE
 0701  REF   4 LAST 539        17,3123  6 3115 1           AD     SCALEBND
 0702                          17,3124  0 0006 1           EXTEND              MAGNITUDE.
 0703  REF   1                 17,3125  6 3064 0           BZMF   JRGSCALR

 0704  REF   1                 17,3126  31'476 0  JRGLIMS  CAE    JRGLM1       SET URGENCY LIMIT FOR 2(+9) SCALING.
 0705  REF   1                 17,3127  54 066 0  JRGFUDGE TS     JRGLIMIT

R0706  USE JRGENCY FUNCTION CORRECTION FACTOR WHEN NECESSARY:

 0707  REF   6 LAST 478        17,3130  11'660 1           CCS    AOSQ         IF C(AOSQ) ZERO OR IF C(URGENCYQ) ZERO,
 0708  REF   9 LAST 539        17,3131  4 1502 0           CS     JRGENCYQ     THEN IT IS CLEARLY UNNECESSARY TO FUDGE.
 0709                          17,3132  1 3134 0           TCF    +2           WHILE MAKING THIS TEST, WE CALCULATE
 0710  REF  10 LAST 539        17,3133  31'502 1           CAE    JRGENCYQ     -SIGN(AOSQ)(URGENCYQ) WHICH IF POSITIVE
 0711                          17,3134  0 0006 1           EXTEND              INDICATES THAT WE ARE TRYING TO FIGHT
 0712  REF   1                 17,3135  6 3142 0           BZMF   JRGFUDG1     THE EFFECT OF AOSQ, SO WE DO NOT FUDGE.

 0713  REF   3 LAST 477        17,3136  31'725 0           CAE    JRGRATQ      HERE WE KNOW THAT AOSQ WILL ACTUALLY
 0714                          17,3137  0 0006 1           EXTEND              HELP THE RCS JETS MANEUVER FOR THIS AXIS
 0715  REF  11 LAST 539        17,3140  7 1502 0           MP     JRGENCYQ     FOR THIS CSP, MULTIPLYING BY JRGRATQ
 0716  REF  12 LAST 539        17,3141  55'502 0           TS     JRGENCYQ     REDUCES URGENCYQ APPROPRIATELY ENOUGH.

 0717  REF   1                 17,3142  11'661 0  JRGFUDG1 CCS    AOSR         HERE WE DO THE SAME LOGIC FOR THE R-AXIS
 0718  REF   7 LAST 538        17,3143  4 1504 0           CS     JRGENCYR     COMPUTATIONS AS WE DID FOR THE Q-AXIS AT
 0719                          17,3144  1 3146 0           TCF    +2           URGFUDGE.  RATHER THAN REPEAT THE ABOVE
 0720  REF   8 LAST 539        17,3145  31'504 1           CAE    JRGENCYR     COMMENTS, WE PROVIDE A BIT OF FURTHER
 0721                          17,3146  0 0006 1           EXTEND              EXPLANATION: FIRST, ONLY A S.P. URGENCY
 0722  REF   1                 17,3147  6 3154 1           BZMF   JRGPLANE     IS SAVED IF WE DO THE FUDGE, SINCE ONLY

 0723  REF   2 LAST 478        17,3150  31'726 0           CAE    JRGRATR      S.P. URGENCIES ARE REFERENCED BELOW AND
 0724                          17,3151  0 0006 1           EXTEND              NO D.P. ACCURACY IS NEEDED.  SECOND, BY
 0725  REF   9 LAST 539        17,3152  7 1504 0           MP     JRGENCYR     BY MULTIPLYING BY THE FUDGE RATIO DURING
 0726  REF  10 LAST 539        17,3153  55'504 0           TS     JRGENCYR     APS BURNS, WE PREVENT SOME RCS FIRINGS
A0727                                                                          WHICH WOULD OVER-CORRECT DUE TO THE AOS.

 0728  REF  13 LAST 539        17,3154  31'502 1  JRGPLANE CAE    JRGENCYQ     BEGIN URGENCY-PLANE COMPUTATIONS:
 0729                          17,3155  0 0006 1           EXTEND
 0730  REF   1                 17,3156  1 3310 1           BZF    BURGZERO     TEST FOR BOTH URGENCIES ZERO

 0731                          17,3157  0 0006 1           EXTEND
 0732  REF   1                 17,3160  7 3325 1           MP     -TAN32.5
 0733  REF  11 LAST 539        17,3161  6 1504 1           AD     JRGENCYR
 0734                          17,3162  0 0006 1           EXTEND
 0735  REF   1                 17,3163  7 3323 1           MP     COS22.5
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0736  REF   9 LAST 509    17,3164  55,510 0            TS      TERMA          UR.COS(22.5)-UQ.SIN(22.5)

0737  REF  12 LAST 539    17,3165  4 1504 0            CS      JRGENCYR
0738                      17,3166  0 0006 1            EXTEND
0739  REF   2 LAST 539    17,3167  7 3325 1            MP      -TAN22.5
0740  REF  14 LAST 539    17,3170  6 1502 1            AD      JRGENCYQ
0741                      17,3171  0 0006 1            EXTEND
0742  REF   2 LAST 539    17,3172  7 3323 1            MP      COS22.5
0743  REF   1             17,3173  55,511 1            TS      TERMB          UR.SIN(22.5)+UQ.COS(22.5)

0744  REF  10 LAST 540    17,3174  6 1510 1  A+B/A-B   AD      TERMA
0745  REF   1             17,3175  55,506 1            TS      A+B
0746  REF   2 LAST 540    17,3176  4 1511 1  A-B/ONLY  CS      TERMB
0747  REF  11 LAST 540    17,3177  6 1510 1            AD      TERMA
0748  REF   1             17,3200  55,507 0            TS      A-B

R0749 AXIS AND MODE SELECTION

0750  REF   3 LAST 540    17,3201  31,511 0            CAE     TERMB          B URGENCY TEST
0751                      17,3202  0 0006 1            EXTEND
0752  REF   1             17,3203  6 3326 0            BZMF    NEGBURG

0753  REF  12 LAST 540    17,3204  31,510 1  POSBURG   CAE     TERMA          A URGENCY TEST
0754                      17,3205  0 0006 1            EXTEND
0755  REF   1             17,3206  6 3252 1            BZMF    NEGAPOSB

0756  REF   2 LAST 540    17,3207  31,507 1  POSAPOSB  CAE     A-B
0757                      17,3210  0 0006 1            EXTEND
0758  REF   1             17,3211  6 3233 0            BZMF    MINJGU         NEGATIVE U-AXIS SELECTED

0759  REF   2 LAST 478    17,3212  31,722 1  2/4JET-R  CAE     1/AMINR
0760  REF   5 LAST  54    17,3213  55,633 1            TS      .5ACCMNE
0761                      17,3214  0 0006 1            EXTEND
0762  REF   6 LAST 538    17,3215  3 1414 1            DCA     ER
0763  REF  21 LAST 538    17,3216  53,412 0            DXCH    E
0764  REF   2 LAST 538    17,3217  31,410 0            CAE     EDOT(R)
0765  REF  17 LAST 538    17,3220  55,407 1            TS      EDOT
0766  REF   2 LAST 539    17,3221  30 066 1            CAE     JRGLIMIT
0767  REF  13 LAST 540    17,3222  6 1504 1            AD      JRGENCYR
0768                      17,3223  0 0006 1            EXTEND
0769  REF   2 LAST 525    17,3224  6 3227 0            BZMF    2JETS-R

0770  REF 133 LAST 536    17,3225  4 7763 0  4JETS-R   CS      ONE
0771  REF   1             17,3226  1 3431 0            TCF     POLTYPE        GO FIND BEST POLICY

0772  REF   1             17,3227  11,671 1  2JETS-R   CCS     NJ-R
0773  REF   2 LAST 525    17,3230  1 3225 0            TCF     4JETS-R
0774  REF  59 LAST 536    17,3231  4 7762 1            CS      TWO
0775  REF   2 LAST 540    17,3232  1 3431 0            TCF     POLTYPE        GO FIND BEST POLICY
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0776  REF   2 LAST 478   17,3233  31'723 0  MINUSU   CAE   1/AMINU
0777  REF   6 LAST 540   17,3234  55'633 1            TS    .5ACCMNE
0778  REF  15 LAST 540   17,3235  31'502 1            CAE   JRGENCYQ
0779  REF  14 LAST 540   17,3236   6 1504 1           AD    JRGENCYR
0780  REF   3 LAST 540   17,3237   6 0066 1           AD    JRGLIMIT
0781                     17,3240   0 0006 1           EXTEND
0782  REF   1            17,3241   6 3245 1           BZMF  2JETS-U

0783  REF   1            17,3242   0 3445 1  2JETSM-U TC    JXFORM
0784  REF  25 LAST 521   17,3243   3 6311 1  2-U.RATE CAF   THREE
0785  REF   3 LAST 540   17,3244   1 3431 0           TCF   POLTYPE      GO FIND BEST POLICY

0786  REF   1            17,3245  11'673 0  2JETS-J  CCS   NJ-J
0787  REF   1            17,3246   1 3242 1           TCF   2JETSM-U
0788  REF   2 LAST 541   17,3247   0 3445 1           TC    JXFORM
0789  REF  70 LAST 540   17,3250   3 7762 0           CAF   TWO
0790  REF   4 LAST 541   17,3251   1 3431 0           TCF   POLTYPE      GO FIND BEST POLICY

0791  REF   2 LAST 540   17,3252  31'506 0  NEGAPOSB CAE   A+B
0792                     17,3253   0 0006 1           EXTEND
0793  REF   1            17,3254   6 3271 0           BZMF  PLUSV

0794  REF   4 LAST 536   17,3255  31'721 1  2/4JET-Q CAE   1/AMINQ
0795  REF   7 LAST 541   17,3256  55'633 1            TS    .5ACCMNE
0796  REF   4 LAST 541   17,3257  30 066 1            CAE   JRGLIMIT
0797  REF  16 LAST 541   17,3260   6 1502 1           AD    JRGENCYQ
0798                     17,3261   0 0006 1           EXTEND
0799  REF   2 LAST 525   17,3262   6 3265 0           BZMF  2JETS-Q

0800  REF  13 LAST 501   17,3263   4 7766 0  4JETS-Q  CS    FIVE
0801  REF   5 LAST 541   17,3264   1 3431 0           TCF   POLTYPE      GO FIND BEST POLICY

0802  REF   1            17,3265  11'667 0  2JETS-Q  CCS   NJ-Q
0803  REF   2 LAST 525   17,3266   1 3263 1           TCF   4JETS-Q
0804  REF  14 LAST 501   17,3267   4 6306 0           CS    SIX
0805  REF   6 LAST 541   17,3270   1 3431 0           TCF   POLTYPE      GO FIND BEST POLICY

0806  REF   2 LAST 478   17,3271  31'724 1  PLUSV    CAE   1/AMINV
0807  REF   8 LAST 541   17,3272  55'633 1            TS    .5ACCMNE
0808  REF  15 LAST 541   17,3273   4 1504 0           CS    JRGENCYR
0809  REF  17 LAST 541   17,3274   6 1502 1           AD    JRGENCYQ
0810  REF   5 LAST 541   17,3275   6 0066 1           AD    JRGLIMIT
0811                     17,3276   0 0006 1           EXTEND
0812  REF   1            17,3277   6 3303 1           BZMF  2JETS+V

0813  REF   1            17,3300   0 3437 1  2JETSM+V TC    VXFORM
0814  REF  14 LAST 541   17,3301   3 7766 1  2+V.RATE CAF   FIVE
0815  REF   7 LAST 541   17,3302   1 3431 0           TCF   POLTYPE      GO FIND BEST POLICY

0816  REF   1            17,3303  11'674 1  2JETS+V  CCS   NJ+V
```

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0817  REF   1                17,3304  1 3300 0                TCF    2JETSM+V
0818  REF   2 LAST 541       17,3305  0 3437 1                TC     VXFORM
0819  REF  18 LAST 536       17,3306  3 7761 0                CAF    FOUR
0820  REF   8 LAST 541       17,3307  1 3431 0                TCF    POLTYPE        GO FIND BEST POLICY

0821  REF  16 LAST 541       17,3310  31'504 1  BURGZERO      CAE    URGENCYR       TEST FOR SECOND URGENCY ALSO ZERO
0822                         17,3311  0 0006 1                EXTEND
0823  REF   1                17,3312  1 2651 0                BZF    GIMBITRY       BOTH URGENCIES ZERO.  TRY THE GTS.

0824                         17,3313  0 0006 1                EXTEND                TIME SAVING A,B CALCULATION
0825  REF   1                17,3314  7 3324 0                MP     SIN22.5
0826  REF   4 LAST 540       17,3315  55'511 1                TS     TERMB          UR,SIN(22.5)
0827  REF  17 LAST 542       17,3316  31'504 1                CAE    URGENCYR
0828                         17,3317  0 0006 1                EXTEND
0829  REF   3 LAST 540       17,3320  7 3323 1                MP     COS22.5
0830  REF  13 LAST 540       17,3321  55'510 0                TS     TERMA          UR,COS(22.5)
0831  REF   1                17,3322  1 3176 0                TCF    A-B/ONLY

0832                         17,3323   35441 0  COS22.5       DEC    0.92388        COSINE OF 22.5 DEGREES
0833                         17,3324   14176 1  SIN22.5       DEC    0.38268        SINE OF 22.5 DEGREES
0834                         17,3325   62575 1  -TAN22.5      DEC    -.41421        NEGATIVE OF TANGENT OF 22.5 DEGREES

0835  REF  14 LAST 542       17,3326  31'510 1  NEGBURG       CAE    TERMA          A URGENCY TEST
0836                         17,3327  0 0006 1                EXTEND
0837  REF   1                17,3330  6 3353 1                BZMF   NEGANEGB

0838  REF   3 LAST 541       17,3331  31'506 0  POSANEGB      CAE    A+B
0839                         17,3332  0 0006 1                EXTEND
0840  REF   1                17,3333  6 3416 1                BZMF   2/4JET+Q

0841  REF   3 LAST 541       17,3334  31'724 1  MINUSV        CAE    1/AMINV
0842  REF   9 LAST 541       17,3335  55'633 1                TS     .5ACCMNE
0843  REF  18 LAST 541       17,3336  4 1502 0                CS     URGENCYQ
0844  REF  18 LAST 542       17,3337  6 1504 1                AD     URGENCYR
0845  REF   6 LAST 541       17,3340  6 0066 1                AD     URGLIMIT
0846                         17,3341  0 0006 1                EXTEND
0847  REF   1                17,3342  6 3346 0                BZMF   2JETS-V

0848  REF   3 LAST 542       17,3343  0 3437 1  2JETSM-V      TC     VXFORM
0849  REF  12 LAST 501       17,3344  3 7765 1  2-V,RATE      CAF    SEVEN
0850  REF   9 LAST 542       17,3345  1 3431 0                TCF    POLTYPE        GO FIND BEST POLICY

0851  REF   1                17,3346  11'675 0  2JETS-V       CCS    VJ-V
0852  REF   1                17,3347  1 3343 1                TCF    2JETSM-V
0853  REF   4 LAST 542       17,3350  0 3437 1                TC     VXFORM
0854  REF  15 LAST 541       17,3351  3 6306 1                CAF    SIX
0855  REF  10 LAST 542       17,3352  1 3431 0                TCF    POLTYPE        GO FIND BEST POLICY

0856  REF   3 LAST 540       17,3353  31'507 1  NEGANEGB      CAE    A-B
0857                         17,3354  0 0006 1                EXTEND
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```
0858  REF   1                17,3355  6 3375 0            BZMF   2/4JET+R

0859  REF   3 LAST 541       17,3356  31'723 0  PLUSU     CAE    1/AMTNU
0860  REF  10 LAST 542       17,3357  55'633 1            TS     .5ACCMNE
0861  REF   7 LAST 542       17,3360  4 0066 0            CS     JRGLIMIT
0862  REF  19 LAST 542       17,3361  6 1502 1            AD     JRGENCYQ
0863  REF  19 LAST 542       17,3362  6 1504 1            AD     JRGENCYR
0864                         17,3363  0 0006 1            EXTEND
0865  REF   1                17,3364  6 3372 1            BZMF   2JETSM+U

0866  REF   1                17,3365  11'672 1  2JETS+J   CCS    NJ+J
0867  REF   2 LAST 543       17,3366  1 3372 0            TCF    2JETSM+U
0868  REF   3 LAST 541       17,3367  0 3445 1            TC     JXFORM
0869  REF 186 LAST 534       17,3370  3 7767 0            CAF    ZERO
0870  REF  11 LAST 542       17,3371  1 3431 0            TCF    POLTYPE         GO TO FIND BEST POLICY

0871  REF   4 LAST 543       17,3372  0 3445 1  2JETSM+U  TC     JXFORM
0872  REF 134 LAST 540       17,3373  3 7763 1  2+U,RATE  CAF    ONE
0873  REF  12 LAST 543       17,3374  1 3431 0            TCF    POLTYPE         GO FIND BEST POLICY

0874  REF   3 LAST 540       17,3375  31'722 1  2/4JET+R  CAE    1/AMTNR
0875  REF  11 LAST 543       17,3376  55'633 1            TS     .5ACCMNE
0876                         17,3377  0 0006 1            EXTEND
0877  REF   7 LAST 540       17,3400  3 1414 1            DCA    ER
0878  REF  22 LAST 540       17,3401  53'412 0            DXCH   E
0879  REF   3 LAST 540       17,3402  31'410 0            CAE    EDOT(R)
0880  REF  18 LAST 540       17,3403  55'407 1            TS     EDOT
0881  REF  20 LAST 543       17,3404  4 1504 0            CS     JRGENCYR
0882  REF   8 LAST 543       17,3405  6 0066 1            AD     JRGLIMIT
0883                         17,3406  0 0006 1            EXTEND
0884  REF   2 LAST 525       17,3407  6 3412 0            BZMF   2JETS+R

0885  REF  26 LAST 541       17,3410  4 6311 0  4JETS+R   CS     THREE
0886  REF  13 LAST 543       17,3411  1 3431 0            TCF    POLTYPE         GO FIND BEST POLICY

0887  REF   1                17,3412  11'670 0  2JETS+R   CCS    NJ+R
0888  REF   2 LAST 525       17,3413  1 3410 0            TCF    4JETS+R
0889  REF  19 LAST 542       17,3414  4 7761 1            CS     FOUR
0890  REF  14 LAST 543       17,3415  1 3431 0            TCF    POLTYPE         GO FIND BEST POLICY

0891  REF   5 LAST 541       17,3416  31'721 1  2/4JET+Q  CAE    1/AMTNQ
0892  REF  12 LAST 543       17,3417  55'633 1            TS     .5ACCMNE
0893  REF  20 LAST 543       17,3420  4 1502 0            CS     JRGENCYQ
0894  REF   9 LAST 543       17,3421  6 0066 1            AD     JRGLIMIT
0895                         17,3422  0 0006 1            EXTEND
0896  REF   2 LAST 524       17,3423  6 3426 1            BZMF   2JETS+Q

0897  REF  13 LAST 542       17,3424  4 7765 0  4JETS+Q   CS     SEVEN
0898  REF  15 LAST 543       17,3425  1 3431 0            TCF    POLTYPE         GO FIND BEST POLICY
```

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```
0899    REF   8 LAST  55     17,3426   11,666 1  2JETS+2   CCS     NJ+2
0900    REF   2 LAST 524     17,3427   1 3424 1            TCF     4JETS+Q
0901    REF   1              17,3430   4 7760 0            CS      EIGHT

R0902   GENERALIZED CALLING SEQUENCE FOR ALL Q,R-AXES ROTATIONS (FROM BANK 17):

0903    REF   1              17,3431   54 061 1  POLTYPE   TS      NETACNDX    SAVE INDEX INDICATING AXIS, DIRECTION,
0904                         17,3432   0 0006 1            EXTEND                AND NUMBER OF JETS REQUESTED (THIS SPEC-
0905    REF   1              17,3433   3 3436 0            DCA     POLADR        IFIES THE "OPTIMAL" POLICY.  TRANSFER
0906                         17,3434   52 006 0            DTCB                  ACROSS BANKS TO POLICY SELECTION ROUTINE

0907    REF   8 LAST 531                    E6             EBANK=  JTSONNOW
0908                         17,3435   02321 0  POLADR    2CADR   POLTYPEP     2CADR OF JET POLICY SELECT ROUINTE.
C0908   REF   1              17,3436   40066 0
```

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R0909 SUBROUTINES UXFORM AND VXFORM CALCULATE NEEDED VALUES FOR T-JET LAW
R0910 (THEY GO OFF TO REDUCE RATE, IF NECESSARY, AND THEN DO NOT RETURN)

```
0911  REF   1              17,3437  31'713 0  VXFORM   CAE    1/2JETSV     GET INVERSE OF V-JET ACCELERATION
0912  REF   2 LAST 526     17,3440  54 066 0           TS     1/VJETAC
0913  REF   2 LAST 538     17,3441  4 1411 0           CS     EQ           COMPLEMENT FOR TRANSFORMATION
0914  REF   3 LAST 545     17,3442  55'411 0           TS     EQ
0915  REF   4 LAST 536     17,3443  4 1423 1           CS     EDOTD
0916  REF   1              17,3444  1 3450 1           TCF    JVXFORM +1
0917  REF   1              17,3445  31'707 0  JXFORM   CAE    1/2JETSU     SET INVERSE OF U-JET ACCELERATION
0918  REF   3 LAST 545     17,3446  54 066 0           TS     1/VJETAC

0919  REF   5 LAST 545     17,3447  31'423 0  JVXFORM  CAE    EDOTD        TRANSFORM ANGULAR RATE TO U/V-AXIS
0920  REF   3 LAST 535     17,3450  6 1424 1           AD     EDOTR
0921                       17,3451  0 0006 1           EXTEND
0922  REF   1              17,3452  7 3525 1           MP     .707
0923  REF  19 LAST 543     17,3453  55'407 1           TS     EDOT         SAVE FOR REDUCEUV
0924                       17,3454  0 0006 1           EXTEND
0925  REF  20 LAST 506     17,3455  7 7761 1           MP     BIT3
0926                       17,3456  0 0006 1           EXTEND
0927  REF   1              17,3457  1 3465 1           BZF    JVEDOT       BRANCH IF RESCALING SUCCESSFUL.

0928  REF 246 LAST 537     17,3460  10 000 0           CCS    A            LIMIT EDOT TO +/- 11.25 DEG/SEC.
0929  REF  32 LAST 537     17,3461  3 7743 0           CAF    POSMAX
0930  REF   1              17,3462  1 3466 1           TCF    JVEDOT1
0931  REF  33 LAST 545     17,3463  4 7743 1           CS     POSMAX
0932  REF   2 LAST 545     17,3464  1 3466 1           TCF    JVEDOT1

0933  REF 103 LAST 536     17,3465  30 001 0  JVEDOT   CAE    L
0934  REF  20 LAST 545     17,3466  55'407 1  JVEDOT1  TS     EDOT         RATE ERROR SCALED AT PI/16.
0935                       17,3467  0 0006 1           EXTEND
0936                       17,3470  7 0000 0           SQUARE
0937  REF   8 LAST 536     17,3471  55'412 0           TS     EDOT(2)      SAVE RATE SQUARED SCALED AT PI(2)/2(8)

0938  REF   4 LAST 545     17,3472  31'411 1           CAE    EQ           TRANSFORM ATTITUDE ERROR TO U/V -AXIS
0939  REF   8 LAST 543     17,3473  6 1413 0           AD     ER
0940                       17,3474  0 0006 1           EXTEND
0941  REF   2 LAST 545     17,3475  7 3525 1           MP     .707
0942  REF  23 LAST 543     17,3476  55'411 0           TS     E

0943  REF 194 LAST 520     17,3477  0 0002 0           TC     Q


0944                       17,3500  77545 0  -1.5CSPQ  DEC    -.00938
0945                       17,3501  00014 1  +TJMINT6  DEC    +.00073
0946                       17,3502  77757 1  -TJMIN16  DEC    -.00097
0947  REF   1                       17,3502  -TJMINDR  EQUALS -TJMIN16
0948                       17,3503  00050 1  38.7MAT4  DEC    0.00242
0949                       17,3504  77733 0  -MS35AT4  DEC    -.00219      -35MS SCALED AT 4
```

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0950		17,3505	34344	0	MAXRATE DEC	0.88889	10 DEGREES/SECOND SCALED AT PI/16
0951		17,3506	31221	1	MAXRATE2 DEC	0.79012	100 DEG(2)/SEC(2) SCALED AT PI(2)/2(8)
0952		17,3507	01552	1	.6DEG/SC DEC	0.05333	6/10 DEGREES/SECOND SCALED AT PI/16
0953		17,3510	31000	0	25/32QR DEC	0.78125	

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R0954 THESE TWO SUBROUTINES TRANSFORM EDOTQ,EDOTR INTO THE U/V-AXIS (RESPECTIVELY) FOR THE RATE COMMAND MODE (ONLY).
R0956 VALUE IS STORED IN EDOTGEN SCALED AT PI/4 RADIANS/SECOND.

```
 0957                                  17,3511                BANK    17
 0958  REF   2 LAST 545    17,3511   31'707 0  EDOTUGEN  CAE     1/2JETSU      FOR U-AXIS TRANSFORMATION
 0959  REF   4 LAST 545    17,3512   54 066 0            TS      1/NJETAC
 0960  REF   6 LAST 545    17,3513   31'423 0            CAE     EDOTQ
 0961                       17,3514   1 3520 1            TCF     +4
 0962  REF   2 LAST 545    17,3515   31'713 0  EDOTVGEN  CAE     1/2JETSV      FOR V-AXIS TRANSFORMATION
 0963  REF   5 LAST 547    17,3516   54 066 0            TS      1/NJETAC
 0964  REF   7 LAST 547    17,3517   4 1423 1            CS      EDOTQ
 0965  REF   4 LAST 545    17,3520   6 1424 1            AD      EDOTR
 0966                       17,3521   0 0006 1            EXTEND
 0967  REF   3 LAST 545    17,3522   7 3525 1            MP      .707
 0968  REF   6 LAST 525    17,3523   55'437 1            TS      RATEDIF
 0969  REF 135 LAST 545    17,3524   0 0002 0            TC      Q

 0970                       17,3525   26501 1  .707      DEC     0.70711

 0971                       17,3526   0 0006 1  SPSBACJP  EXTEND
 0972  REF   1              17,3527   3 3532 0            DCA     SPSRCSAD
 0973  REF  17 LAST 534     17,3530   52 006 0            DXCH    Z
 0974  REF  13 LAST 534                    E6            EBANK=  DT
 0975                       17,3531   03417 0  SPSRCSAD  2CADR   SPSRCS
C0975  REF   1              17,3532   42066 1
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P0976  *********TJETLAW*************************************************************************************

0978  REF  21 LAST 545     17,3533  4 1407 1  TJETLAW  CS    EDOT      TEST ON EDOT SIGN;
0979                       17,3534  0 0006 1            EXTEND
0980                       17,3535  6 3541 1            BZMF  +4
0981  REF  22 LAST 548     17,3536  55'407 1            TS    EDOT      SIGNS OF E AND EDOT CHANGED IF EDOT NEG.
0982  REF  24 LAST 545     17,3537  4 1411 0            CS    E         TO CONSIDER FUNCTIONS IN THE UPPER HALF
0983  REF  25 LAST 548     17,3540  55'411 0            TS    E         OF THE E-DOT PHASE PLANE.

0984  REF   9 LAST 545     17,3541  31'412 1            CAE   EDOT/2)   SCALED AT PI(2)/2(+8) RAD(2)/SEC(2)
0985                       17,3542  0 0006 1            EXTEND          1/NETACC HAS BEEN SET FOR N-JETS WITH
0986  REF   2 LAST  57     17,3543  7 0066 0            MP    1/NETACC  IMPLICIT FACTOR OF (1/2).
0987  REF  26 LAST 548     17,3544  6 1411 1            AD    E         ATTITUDE ERROR SCALED AT PI RADIANS.
0988                       17,3545  0 0006 1            EXTEND          DEADBAND VALUE SCALED AT PI RADIANS.
0989  REF   9 LAST 536     17,3546  60 375 0            SU    DB        E+.5EDOT/NETACC-DB
0990  REF   2 LAST  50     17,3547  55'444 0            TS    HDAP      SCALED AT PI RADIANS.

0991                       17,3550  0 0006 1            EXTEND
0992  REF   1              17,3551  6 3617 1            BZMF  NEGHDAP

0993  REF  23 LAST 548     17,3552  31'407 0            CAE   EDOT      RATE ERROR; LIMITED TO +/- 11.25 DEG/SEC
0994                       17,3553  0 0006 1            EXTEND          SCALED AT PI/16 RADIANS/SECOND.
0995  REF   3 LAST 548     17,3554  7 0066 0            MP    1/NETACC  SCALED AT 2(+8)/PI SEC(2)/RAD; (ACC)(-1)
0996                       17,3555  20 001 1            DDOUBL          SCALED AT 2(+4) SECONDS.
0997  REF  15 LAST 542     17,3556  55'510 0            TS    TERMA

0998  REF   1              17,3557  6 3500 1            AD    -1.5CSPQ  (EDOT/NETACC)-1.5CSP SCALED AT 16 SECS.
0999                       17,3560  0 0006 1            EXTEND
1000                       17,3561  6 3564 0            BZMF  +3

1001  REF  37 LAST 507     17,3562  3 7746 0  MAXTJET   CAF   BIT14     (1/2) IS LIKE POSMAX AT THIS SCALING.
1002  REF   1              17,3563  1 2456 0            TCF   NORMRETN  (OVERFLOW IS PREVENTED IN THIS WAY.)

1003  REF   3 LAST 548     17,3564  4 1444 0            CS    HDAP      MINIMPDB=E-(EDOT(2)/NETACC)+DB
1004  REF   3 LAST 479     17,3565  6 1631 1            AD    MINIMPDB  SCALED AT PI RADIANS.
1005                       17,3566  0 0006 1            EXTEND          (DURING APS BURNS, MINIMPDB = -DB.)
1006  REF   1              17,3567  6 3646 0            BZMF  MAINBRCH

1007  REF  16 LAST 548     17,3570  31'510 1            CAE   TERMA     EDOT/NETACC-35MS SCALED AT 16 SECONDS.
1008  REF   1              17,3571  6 3504 0            AD    -M535AT4
1009                       17,3572  0 0006 1            EXTEND          COMPARE TIME-TO-GET-ZERO-RATE WITH 35MS.
1010  REF   1              17,3573  6 3576 0            BZMF  INZONE4

1011  REF   1              17,3574  6 3503 1            AD    38.7MAT4  TIME-TO-GET-ZERO-RATE + 1/2 MINIMP.
1012  REF   1              17,3575  1 3742 1            TCF   TJETSCAL

1013  REF  24 LAST 548     17,3576  11'407 1  INZONE4   CCS   EDOT      IF EDOT IS EITHER 00001, 00000, 77777,
1014                       17,3577  0 0006 1            EXTEND          OR 77776 (IN OCTAL), THEN THIS CODING
1015  REF   9 LAST 533     17,3600  1 2413 1            BZF   XTRANS    CAUSES A BRANCH TO XTRANS, NO ROTATION
1016                       17,3601  0 0006 1            EXTEND          JETS ARE FIRED. *** NOTE: IF THE EXTEND
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1017  REF  10 LAST 548    17,3602  1 2413 1            BZF    XTRANS      CODE IS SKIPPED, BZF EXECUTES LIKE TCF.


1018  REF   2 LAST  53    17,3603  31'607 1            CAE    NO.QJETS    IF NO Q-AXIS JETS THEN MUST HAVE R-AXIS.
1019                      17,3604  0 0006 1            EXTEND
1020  REF   1             17,3605  1 3613 1            BZF    ROTRAXIS

1021  REF   3 LAST 535    17,3606  30 775 1            CAE    OMEGAQD     WITH Q-AXIS JETS, ZERO THE RATE ERROR.
1022  REF   7 LAST 535    17,3607  55'416 1            TS     OMEGAQ

1023  REF   1             17,3610  31'610 1            CAE    NO.RJETS    IF NO R-AXIS JETS, THEN Q-AXIS JETS WERE
1024                      17,3611  0 0006 1            EXTEND              ALREADY FOUND.
1025  REF   1             17,3612  1 3615 1            BZF    DOTJMIN

1026  REF   5 LAST 535    17,3613  30 776 1  ROTRAXIS  CAE    OMEGARD     WITH R-AXIS JETS, ZERO THE RATE ERROR.
1027  REF  10 LAST 535    17,3614  55'420 1            TS     OMEGAR

1028  REF   1             17,3615  3 3501 0  DOTJMIN   CAF    +TJMINT6    USE MINIMUM IMPULSE DT FOR TQR.
1029  REF   2 LAST 548    17,3616  1 2456 0            TCF    NORMRETN

1030  REF  10 LAST 548    17,3617  31'412 1  NEGHDAP   CAE    EDOT(2)     RATE ERROR SQUARED SCALED AT PI(2)/2(8).
1031                      17,3620  0 0006 1            EXTEND
1032  REF  13 LAST 543    17,3621  7 1633 1            MP     .5ACCMNE    .5(1/ACCMIN) AT 2(8)/PI SEC(2)/RAD.
1033  REF  27 LAST 548    17,3622  6 1411 1            AD     E           ATTITUDE ERROR SCALED AT PI RADIANS
1034  REF  10 LAST 548    17,3623  6 0375 0            AD     DB          DEADBANDS (2) SCALED AT PI RADIANS
1035  REF   4 LAST 479    17,3624  6 1630 0            AD     DBMINIMP    (DURING APS BURNS DBMINIMP = 0.)
1036                      17,3625  0 0006 1            EXTEND
1037                      17,3626  6 3630 1            BZMF    +2
1038  REF  11 LAST 549    17,3627  1 2413 1            TCF    XTRANS      NO ROTATION JETS NEEDED.

1039  REF   1             17,3630  4 3505 0  +2        CS     MAXRATE     10 DEGREES/SECOND SCALED AT PI/16.
1040  REF  25 LAST 548    17,3631  6 1407 0            AD     EDOT        EDOT-MAXRATE SCALED AT PI/16 RAD/SEC.
1041                      17,3632  0 0006 1            EXTEND
1042                      17,3633  6 3635 1            BZMF    +2
1043  REF  12 LAST 549    17,3634  1 2413 1            TCF    XTRANS

1044  REF  26 LAST 549    17,3635  4 1407 1  +2        CS     EDOT        RATE ERROR SCALED AT PI/16 RAD/SEC.
1045                      17,3636  0 0006 1            EXTEND              (LIMITED TO +/- 11.25 DEG/SEC.)
1046  REF   4 LAST 548    17,3637  7 0066 0            MP     1/NETACC    SCALED AT 2(+8)/PI SEC(2)/RAD; (ACC):=1)
1047                      17,3640  20 001 1            DDOUBL              SCALED AT 2(+4) SECONDS.
1048  REF  17 LAST 548    17,3641  55'510 0            TS     TERMA

1049  REF   4 LAST 548    17,3642  4 1444 0            CS     HDAP        -E+(.5EDOT(2)/NETACC)+DB
1050  REF  28 LAST 549    17,3643  6 1411 1            AD     E
1051  REF  29 LAST 549    17,3644  6 1411 1            AD     E           TWICE ERROR NEGATES E OF HDAP(ABOVE)
1052  REF   4 LAST 548    17,3645  6 1631 1            AD     MINIMPDB
1053  REF   5 LAST 549    17,3646  55'444 0  MAINBRCH  TS     HDAP        -HDAP(ABOVE)+2E+DBMINIMP AT PI RADIANS.

1054  REF   5 LAST 549    17,3647  30 066 1            CAE    1/NETACC    .5(1/NETACC+1/ACCMIN) SCALED AT 2(8)/PI.
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1055  REF  14 LAST 549   17,3650  27'633 1          ADS    .5ACCMNE        .5ACCMNE NOW HOLDS DENOM.

1056                     17,3651  0 0006 1          EXTEND                 DENOM(MAXRATE(2))*HDAP AT PI RADIANS.
1057  REF   1            17,3652  7 3506 0          MP     MAXRATE2
1058  REF   6 LAST 549   17,3653  6 1444 1          AD     HDAP
1059                     17,3654  0 0006 1          EXTEND
1060  REF   1            17,3655  6 3734 1          BZMF   NORDOT

1061  REF   6 LAST 549   17,3656  30 066 1          CAE    1/NETACC        SAVE (1/NETACC)(2)
1062                     17,3657  6 0000 1          DOUBLE
1063                     17,3660  0 0006 1          EXTEND
1064                     17,3661  7 0000 0          SQUARE
1065  REF   1            17,3662  53'514 1          DXCH   INVACCSQ

1066  REF   7 LAST 550   17,3663  31'444 1          CAE    HDAP            (HDAP)/(DENOM)
1067                     17,3664  22 007 0          ZL
1068                     17,3665  0 0006 1          EXTEND
1069  REF  15 LAST 550   17,3666  11'633 1          DV     .5ACCMNE
1070  REF   1            17,3667  55'727 0          TS     QUOTTEMP

1071                     17,3670  0 0006 1          EXTEND                 +(HDAP/DENOM)(1/NETACC)(2) AT 2(8) SECS.
1072  REF   2 LAST 550   17,3671  7 1514 1          MP     INVACCSQ +1
1073  REF   3 LAST 550   17,3672  55'514 1          TS     INVACCSQ +1
1074  REF 187 LAST 543   17,3673  3 7767 0          CAF    ZERO
1075  REF   4 LAST 550   17,3674  57'513 1          XCH    INVACCSQ
1076                     17,3675  0 0006 1          EXTEND
1077  REF   2 LAST 550   17,3676  7 1727 0          MP     QUOTTEMP
1078  REF   5 LAST 550   17,3677  21'514 1          DAS    INVACCSQ

1079                     17,3700  0 0006 1          EXTEND                 SAVE COPY OF ABOVE D.P. VALUE
1080  REF   6 LAST 550   17,3701  3 1514 0          DCA    INVACCSQ
1081  REF   5 LAST 542   17,3702  53'512 1          DXCH   TERMB

1082  REF   2 LAST 548   17,3703  3 3500 1          CAF    -1.5CSPQ        (1.5CSP-EDOT/NETACC) AT 16 SECS.
1083  REF  18 LAST 549   17,3704  6 1510 1          AD     TERMA
1084                     17,3705  0 0006 1          EXTEND
1085                     17,3706  7 0000 0          SQUARE                 (1.5CSP-EDOT/NETACC)(2) AT 256 SECS.
1086  REF   7 LAST 550   17,3707  21'514 1          DAS    INVACCSQ        (1.5CSP-EDOT/NETACC)(2) - TERMB

1087  REF   8 LAST 550   17,3710  31'513 1          CAE    INVACCSQ        CHECK HIGH ORDER PART. IF NON-ZERO.
1088                     17,3711  0 0006 1          EXTEND
1089  REF   1            17,3712  1 3714 1          BZF    ONLYTST1
1090  REF   2 LAST 550   17,3713  1 3715 0          TCF    ONLYTST1 +1

1091  REF   9 LAST 550   17,3714  31'514 0 ONLYTST1 CAE    INVACCSQ +1     USE LOW ORDER PART, SINCE HIGH PART 0.
1092                     17,3715  0 0006 1          EXTEND
1093  REF   1            17,3716  6 3562 0          BZMF   MAXJET

1094  REF   2 LAST 545   17,3717  3 3502 0          CAF    -TJMIN16        -EDOT/NETACC-TJMIN SCALED AT 16.
1095  REF  19 LAST 550   17,3720  6 1510 1          AD     TERMA
```

L Q+R-AXES REACTION CONTROL SYSTEM AUTOPILOT USER'S OWN PAGE NO. 33 S3 E6

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1096                    17,3721  0 0006 1          EXTEND
1097  REF   1           17,3722  6 3746 1          BZMF    MAYNOJET

1098  REF   1           17,3723  3 3733 0  PREROOT CAF     AFTRUTAD       THIS WILL CAUSE SQUARE ROOT TO BE TAKEN
1099  REF  11 LAST 521  17,3724  55*000 1          TS      T5ADR          ON THE NEXT T5RUPT.
1100                    17,3725  0 0006 1          EXTEND
1101                    17,3726  00 005 1          READ    5
1102  REF   1           17,3727  55*654 0          TS      CH5TEMP
1103  REF   9 LAST 544  17,3730  31*471 1  JETSON  CAE     JTSONNOW       TURN ON JETS AND END RUPT
1104  REF   5 LAST 530  17,3731  0 6046 0          TC      WRITEOR
1105  REF  34 LAST 529  17,3732  1 5733 1          TCF     RESJME

1106  REF   1           17,3733   03214 0  AFTRUTAD GENADR  DORJTDUM
1107  REF   2 LAST 549  17,3734  3 3505 1  NOROOT  CAF     MAXRATE
1108  REF   1           17,3735  6 3507 0          AD      .6DEG/SC       MAXRATE+DEL SCALED AT PI/16 RAD/SEC.
1109                    17,3736  0 0006 1          EXTEND
1110  REF   7 LAST 550  17,3737  7 0066 0          MP      1/NETACC       (MAXRATE+DEL)/NETACC
1111                    17,3740  20 001 1          DDOUBL                 SCALED AT 2(+4) SECONDS
1112  REF  20 LAST 550  17,3741  6 1510 1  TJSUM   AD      TERMA
1113                    17,3742  6 0000 1  TJETSCAL DOUBLE               NOW SCALED AT 2(+3) SECONDS.
1114                    17,3743  0 0006 1          EXTEND
1115  REF   1           17,3744  7 3510 1          MP      25/32QR        SCALED TO 16/25 2(+4) SECONDS AS TIME6.
1116  REF   3 LAST 549  17,3745  1 2456 0          TCF     NORMRETN

1117                    17,3746  0 0006 1  MAYNOJET EXTEND                RE-INITIALIZE C(INVACCSQ,D.P.)
1118  REF   6 LAST 550  17,3747  3 1512 0          DCA     TERMR          SINCE CLOBBERED ABOVE.
1119  REF  10 LAST 550  17,3750  53*514 1          DXCH    INVACCSQ

1120  REF   3 LAST 550  17,3751  3 3502 0          CAF     -TJMIN16
1121  REF  21 LAST 551  17,3752  6 1510 1          AD      TERMA          TERMA-TJMIN SCALED AT 2(+4) SECONDS.
1122                    17,3753  0 0006 1          EXTEND
1123                    17,3754  7 0000 0          SQUARE                 SCALED AT 2(+8) SECONDS.
1124  REF  11 LAST 551  17,3755  21*514 1          DAS     INVACCSQ       FORM D.P. SUM.

1125  REF  12 LAST 551  17,3756  31*513 1          CAE     INVACCSQ       CHECK HIGH ORDER PART IF NON-ZERO.
1126                    17,3757  0 0006 1          EXTEND
1127  REF   1           17,3760  1 3762 0          BZF     ONLYTST2
1128  REF   2 LAST 551  17,3761  1 3763 1          TCF     ONLYTST2 +1

1129  REF  13 LAST 551  17,3762  31*514 0  ONLYTST2 CAE     INVACCSQ +1    USE LOW ORDER PART, SINCE HIGH PART 0.
1130                    17,3763  0 0006 1          EXTEND
1131  REF   1           17,3764  6 3723 1          BZMF    PREROOT
1132  REF   2 LAST 549  17,3765  1 3615 1          TCF     DOTJMIN        FIRE FOR MINIMUM IMPULSE.
11325                   17,3766   37777 1  CHKSUM17 OCT     37777
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L       Q-R-AXES REACTION CONTROL SYSTEM AUTOPILOT                      USER'S OWN PAGE NO.  34          S3  E6

P1133   SUBROUTINE NAME: DAPSQRT       MOD. NO. 0  DATE: DECEMBER 2a, 1966

R1134   AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R1135   DAPSQRT IS A SUBROUTINE WHICH PERFORMS THE NECESSARY AND APPROPRIATE INTERFACE FUNCTIONS BETWEEN THE LM DAP AND
R1137   THE PRESENT SPROOT SUBROUTINE IN MASTER.  DAPSQRT EXPECTS A DOUBLE PRECISION ARGUMENT IN C(A,L) AND WILL SHIFT
R1139   THAT QUANTITY SIX OR FOUR BITS TO THE LEFT TO FORM A MORE ACCURATE SINGLE PRECISION ARGUMENT FOR SPROOT (AND
R1141   THEN SHIFT THE SINGLE PRECISION RESULT OF SPROOT THREE OR TWO BITS TO THE RIGHT IN ORDER TO MAINTAIN SCALING
R1143   CONSISTENCY).  DAPSQRT ALSO PERFORMS THE HERETOFORE NEGLECTED FUNCTION OF SAVING AND RESTORING THE CONTENTS OF
R1145   THE SR (SHIFT-RIGHT) REGISTER WHICH MUST BE DONE BY ALL USERS OF SPROOT IN INTERRUPT.

R1147   NOTE: IF ORIGINAL C(A) = 0, THEN THE SQUARE ROOT SINGLE PRECISION ARGUMENT IS C(L), AND THE RESULT FROM SPROOT
R1149   IS SHIFTED LEFT SEVEN BITS.

R1150   CALLING SEQUENCE:

A1151                                       L       TC      IBNKCALL        CALL IS ALWAYS FROM ANOTHER BANK.
A1152                                       L +1    CADR    DAPSQRT         ENTER ROUTINE WITH C(A,L) = D.P. ARG.
A1153                                       L +2    (RETURN)                C(A) = BEST VALUE OF SQUARE ROOT.

R1154   ALARM/ABORT MODE: NONE.

R1155   SUBROUTINES CALLED: SPROOT AND T6JOBCHK.

R1156   NORMAL EXIT MODE: RETURN TO L +2.

R1157   OUTPUT: C(A) AT RETURN TO CALLER IS THE BEST SINGLE PRECISION SQUARE ROOT OF THE GIVEN DOUBLE PRECISION ARGUMENT

R1159   ERASABLE INITIALIZATION REQUIRED: DOUBLE PRECISION ARGUMENT AS C(A,L).

R1160   DEBRIS: ITEMP4, ITEMP5, ITEMP6 AND A,L,Q.


 1161                                26,2525            BANK    26
 1162   REF   1                        E6              EBANK=  FUNCTION

A1163                                       SRTEMP  ERASE           SCRATCH CELLS FOR DAPSQRT
A1164                                       SQRTTEMP ERASE          SCRATCH CELLS FOR DAPSQRT
A1165                                       SQRTTEMQ ERASE          SCRATCH CELLS FOR DAPSQRT

 1166   REF   1          26,2525  55'730 0  DAPSQRT TS      SQRTTEMP        SAVE C(A) PART OF DOUBLE PRECISION ARG.

 1167                    26,2526  0 0006 1          EXTEND                 SAVE C(Q) FOR RETURN TO LM DAP CALLER.
 1168   REF   1          26,2527  23'731 0          DXCH    SQRTTEMQ

 1169   REF  19 LAST 285 26,2530  30 021 1          CAE     SR             SAVE C(SR) SINCE ALL INTERRUPT PROGRAMS
 1170                    26,2531  6 0000 1          DOUBLE                 USING SPROOT MUST DO SO.
 1171   REF   2 LAST  56 26,2532  55'727 0         TS      SRTEMP
```

L Q-R-AXES REACTION CONTROL SYSTEM AUTOPILOT USER'S OWN PAGE NO. 35 S3 E6

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1172  REF   4 LAST 535   26,2533  0 6013 0            TC     T6JOBCHK     CHECK TIME6=RUPT BEFORE SPROOT.

1173  REF   2 LAST 552   26,2534  31'730 1            CAE    SQRTTEMP     RESTORE D.P. ARG. TO C(A,L), AND THEN
1174                      26,2535  0 0006 1            EXTEND               CHECK FOR C(A) = +0.  IF SO, TAKE THE
1175  REF   1            26,2536  1 2570 0            BZF    DAPSQRT3     SQUARE ROOT OF C(L) AND POST-SHIFT.

1176  REF   1            26,2537  7 2574 1            MASK   DAPHIGH7     IF THIS MASK PRODUCES A WORD OF ZEROS,
1177                      26,2540  0 0006 1            EXTEND               C(D.P.ARG) WILL BE SHIFTED LEFT 6 BITS
1178  REF   1            26,2541  1 2552 0            BZF    SQRTSL6      WITHOUT OVERFLOWING BEFORE USING SPROOT.

1179  REF   1            26,2542  7 2575 0            MASK   DAPHIGH5     IF THIS MASK PRODUCES A WORD OF ZEROS,
1180                      26,2543  0 0006 1            EXTEND               C(D.P.ARG) WILL BE SHIFTED LEFT 4 BITS
1181  REF   1            26,2544  1 2556 1            BZF    SQRTSL4      WITHOUT OVERFLOWING BEFORE USING SPROOT.

1182  REF   3 LAST 553   26,2545  31'730 1            CAE    SQRTTEMP     GET UNSHIFTED S.P. ARGUMENT FOR SPROOT.

1183  REF   1            26,2546  0 5417 0            TC     SPROOT       CALL SUBROUTINE IN FIXED-FIXED.

1184  REF   3 LAST 552   26,2547  23'727 1  DAPSQRT1  LXCH   SRTEMP      RESTORE C(SR).
1185  REF  20 LAST 552   26,2550  22 021 1            LXCH   SR

1186  REF   2 LAST 552   26,2551  0 1731 0            TC     SQRTTEMQ     RETURN WITH SQUARE ROOT AS C(A).

1187  REF  12 LAST 520   26,2552  3 7753 1  SQRTSL6   CAF    BIT9         SET UP TO SHIFT D.P. ARG. LEFT 6 BITS
1188  REF 136 LAST 547   26,2553  54 002 1            TS     Q
1189  REF  22 LAST 474   26,2554  3 7750 1            CAF    BIT12        AND TO SHIFT SPROOT ANS. RIGHT 3 BITS.
1190  REF   1            26,2555  1 2561 0            TCF    DAPSQRT2

1191  REF  30 LAST 537   26,2556  3 7751 0  SQRTSL4   CAF    BIT11        SET UP TO SHIFT D.P. ARG. LEFT 4 BITS
1192  REF 137 LAST 553   26,2557  54 002 1            TS     Q
1193  REF  20 LAST 495   26,2560  3 7747 1            CAF    BIT13        AND TO SHIFT SPROOT ANS. RIGHT 2 BITS.
1194  REF   4 LAST 553   26,2561  57'730 1  DAPSQRT2  XCH    SQRTTEMP     (RECONSTRUCT D.P. ARGUMENT.)

1195                      26,2562  0 0006 1            EXTEND               VARIABLE LEFT SHIFT (4 OR 6 BITS).
1196  REF 198 LAST 553   26,2563  10 002 1            DV     Q             (MAC HAS DIFFEQ, LM DAP HAS DV Q = PUN?)
1197  REF   2 LAST 553   26,2564  0 5417 0  DAPROOT   TC     SPROOT       CALL SUBROUTINE IN FIXED-FIXED
1198                      26,2565  0 0006 1            EXTEND               VARIABLE RIGHT SHIFT (2 OR 3 BITS).
1199  REF   5 LAST 553   26,2566  7 1730 0            MP     SQRTTEMP

1200  REF   1            26,2567  1 2547 1            TCF    DAPSQRT1     RETURN SEQUENCE.

1201  REF  17 LAST 527   26,2570  3 7754 0  DAPSQRT3  CAF    BIT8         SET UP TO SHIFT SPROOT ANS. RIGHT 7 BITS
1202  REF   6 LAST 553   26,2571  55'730 0            TS     SQRTTEMP
1203  REF 104 LAST 545   26,2572  30 001 0            CAE    L            USE C(L) AS SPROOT ARGUMENT.
1204  REF   1            26,2573  1 2564 0            TCF    DAPROOT

1205                      26,2574   77400 0  DAPHIGH7 OCTAL  77400
1206                      26,2575   76000 0  DAPHIGH5 OCTAL  76000
```

L Q+R-AXES JET SELECT AND FAILURE CONTROL LOGIC USER'S OWN PAGE NO. 1 S3

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R0001   PROGRAM: POLTYPEP              MOD. NO. 1  DATE: NOVEMBER 14, 1966

R0002   AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0003   THIS PROGRAM IS DESIGNED TO SELECT A POLICY OF JETS (OF WHICH NONE HAVE FAILED) WHICH CAN BE USED TO CREATE THE
R0005   ROTATION AND/OR TRANSLATION WHICH IS REQUIRED BY THE LM DAP.  FROM THE INDEX "NETACNDX" (WHICH MUST BE SET WHEN
R0007   ROTATION IS REQUESTED), THE OPTIMAL POLICY IS SELECTED.  WHEN FAILURES ARE DETECTED WITHIN A CHOSEN POLICY, AN
R0009   ALTERNATE POLICY IS SELECTED.  IF ALL ALTERNATE POLICIES ARE EXHAUSTED WITHOUT FINDING AN UNFAILED POLICY, A JET
R0011   FAILURE ABORT IS INITIATED.  WHEN THE ROUTINE IS USE FOR TRANSLATION JETS ONLY, "TRANONLY" MUST BE SET POSITIVE
R0013   (NONZERO) AND THE ENTRY POINT IS "+/-XTRAN".

R0014   CALLING SEQUENCES:

R0015   1. FOR ROTATION (WITH POSSIBLE +X TRANSLATION):

A0016                                   CAF     RETURN          (GENADR OF RETURN)
A0017                                   TS      TJETADR
A0018                                   ...
A0019                                   CAF     INDEXVAL        INDICATE ROT. AXIS, DIRECTION,
A0020                                   TS      NETACNDX        AND NUMBER OF JETS.
A0021                                   EXTEND
A0022                                   DCA     POLADR          TRANSFER ACROSS BANKS TO POLTYPEP.
A0023                                   DTCB

R0024   2. FOR TRANSLATION ONLY:

A0025                                   CAF     POSMAX/NEGMAX   INDICATE -X TRANSLATION BY POSMAX.
A0026                                   TS      ANYTRANS                +X TRANSLATION BY NEGMAX.
A0027                                   CAF     ZERO            ZERO EXTRANEOUS FLAGS FOR ROUTINE
A0028                                   TS      TRANSNOW        ...
A0029                                   TS      TRANSAVE        ...
A0030                                   EXTEND
A0031                                   DCA     JTPOLADR        TRANSFER ACROSS BANKS TO +/-XTRAN
A0032                                   TS      TRANONLY        (AND SET TRANONLY POSITIVE NONZERO.)
A0033                                   DTCB

R0034   SUBROUTINES CALLED: NONE.

R0035   NORMAL RETURN   1. FOR ROTATION, TO ADDRESS IN BANK 17 SPECIFIED BY C(TJETADR).
R0037                  2. FOR TRANSLATION, RESUME.

R0038   ALARM/ABORT MODE: WHENEVER THERE IS NO USABLE JET POLICY FOUND, TRANSFER TO JETABORT.

R0040   INPUT: NETACNDX+CHSMASK+1/NETACS.

R0041   OUTPUT: JETS ON IN CHANNEL 5, JTSATCHG.

R0042   DEBRIS: A+L+ALLL ITEMPS+ALL RUPTREGS.

R0043   INITIALIZATION AT ROTATION REQUEST ENTRY POINT:
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L Q-R-AXES JET SELECT AND FAILURE CONTROL LOGIC USER'S OWN PAGE NO. 2 S3

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0044                                  20,2321          BANK    20
0045   REF  10 LAST 551                  E6           EBANK=  JTSONNOW

0046   REF 188 LAST 550   20,2321  3 7767 0  POLTYPEP CAF     ZERO        SET VOLATILE SWITCHES TO INDICATE
0047   REF   2 LAST 528   20,2322  54 070 1            TS      TRANONLY    1) TRANSLATION ENTRY NOT MADE (ROTATION)
0048   REF   2 LAST 528   20,2323  54 071 0            TS      ANYTRANS    2) NO TRANSLATION KNOWN YET.
0049   REF   2 LAST 528   20,2324  54 072 0            TS      TRANSNOW    3) NO TRANS. DURING ROT. KNOWN YET.
0050   REF   2 LAST 528   20,2325  54 073 1            TS      TRANSAVE    4) NO TRANSLATION POLICY SELECTED YET.

R0051  TEST FOR SENSE OF ROTATION JETS.  (MAKE TRANSLATION REQUEST FROM THE ASTRONAUT'S STICK OVERRIDE INTERNAL ULLAGE)

0053   REF  29 LAST 527   20,2326  3 7755 1            CAF     BIT7        ASTRONAUT +X TRANSLATION REQUEST TEST.
0054                       20,2327  0 0006 1            EXTEND
0055                       20,2330  02 031 1            RAND    31
0056                       20,2331  0 0006 1            EXTEND
0057   REF   1            20,2332  1 2415 1            BZF     +XTRANSL

0058   REF  18 LAST 553   20,2333  3 7754 0            CAF     BIT8        ASTRONAUT -X TRANSLATION REQUEST TEST.
0059                       20,2334  0 0006 1            EXTEND
0060                       20,2335  02 031 1            RAND    31
0061                       20,2336  0 0006 1            EXTEND
0062   REF   1            20,2337  1 2422 0            BZF     -XSENSE

R0063  CHECK FOR ULLAGE OR ASCENT BURN:

0064   REF   1            20,2340  3 2606 0  JLL/+X    CAF     BITS6&8     CHECK FOR ULLAGE OR ASCENT BURN: (EITHER
0065   REF  43 LAST 535   20,2341  7 0077 0            MASK    DAPBOOLS    BIT REQUIRES +X SENSE FOR ROTATION JETS)
0066   REF 247 LAST 545   20,2342  10 000 0            CCS     A           BIT6: ULLAGE BIT  (+X TRANSLATION ASKED)
0067   REF   1            20,2343  1 2411 0            TCF     +XSELECT    BIT8: ASCENT BURN (NO TRANSLATION ASKED)

R0068  LM IS EITHER IN POWERED DESCENT OR IN COASTING FLIGHT  SELECT JETS WHICH ARE PAIRED IN FORCE COUPLES.

0070   REF   2 LAST 544   20,2344  50 061 0            INDEX   NETACNDX     PICK UP FORCE-COUPLE TABLE INDEX AND THE
0071   REF   1            20,2345  3 2626 1            CAF     NORMLPOL    NUMBER OF POLICIES TO CHECK (PACKED).

R0072  UNPACK THE RELATIVE ADDRESS OF THE BEST POLICY AND THE NUMBER OF ALTERNATE POLICIES TO CHECK WITHIN THE LOOP.

R0074  THIS BITS ARE PACKED THUSLY  0XYYY, WHERE X BECOMES C(LOOPCTR) AND YYY BECOMES C(POLRELOC). BITS8,9 ARE ZERO.

0076   REF 105 LAST 553   20,2346  54 001 1  NUMBALTS TS      L           SAVE FULL WORD TO GET BITS 10-12, LATER.
0077   REF   4 LAST 154   20,2347  7 5342 0            MASK    LOW7        MASK BITS GIVING INDEX VALUE FOR BEST
0078   REF   1            20,2350  54 063 0            TS      POLRELOC    POLICY (W.R.T. TOP OF POLTABLE).

0079   REF  38 LAST 538   20,2351  3 7756 1            CAF     BIT6        EXTRACT BITS 10-12 OF ORIGINAL WORD:
0080                       20,2352  0 0006 1            EXTEND              THIS VALUE IS USED AS A LOOP COUNTER TO
0081   REF 106 LAST 555   20,2353  7 0001 1            MP      L           TEST ALL THE FEASIBLE JET POLICIES FOR
0082   REF   1            20,2354  54 064 1  BESTPOLS  TS      LOOPCTR     THE GIVEN REQUEST.  (ALSO TOP OF LOOP.)
```

L Q,R-AXES JET SELECT AND FAILURE CONTROL LOGIC USER'S OWN PAGE NO. 3 53 E6

P0083 LOOP TP SET UP "TRANSNOW" AND REJECT ALL FAILED POLICIES:

```
 0084  REF   2 LAST 555    20,2355  50 063 I          INDEX  POLREFLOC   PICK UP NEXT POLICY TO CHECK FOR FAILURE
 0085  REF   1             20,2356  3 2704 0          CAF    POLTABLE    (MUST DO A "CAF" THEN "CCS" FOR RANGE.)
 0086  REF 248 LAST 555    20,2357  10 000 0          CCS    A           IF POLICY TABLE ENTRY IS NEGATIVE, THEN
 0087  REF   1             20,2360  54 065 0 CHKFAILS TS     THISPOLY    A FLAG IS SET TO DO SOME TRANSLATION
 0088                      20,2361  1 2364 0          TCF    +3          WITH THE ROTATION POLICY SELECTED, IF
 0089  REF   3 LAST 555    20,2362  54 072 0          TS     TRANSNOW    REQUESTED. POLTABLE VALUES ARE CCS-ABLE.
 0090  REF   1             20,2363  1 2360 1          TCF    CHKFAILS    TRANSNOW (ONCE ON) STAYS ON FOR THIS CSP

 0091  REF   2 LAST  88    20,2364  7 0102 0          MASK   CHSMASK     COMPARE THISPOLY WITH BITS OF FAILED JET
 0092  REF 249 LAST 556    20,2365  10 000 0          CCS    A           IF C(A) = +0, THEN THERE ARE NO FAILURES
 0093                      20,2366  1 2370 0          TCF    +2          IN THIS POLICY AND THE LM DAP USES IT.
 0094  REF   1             20,2367  1 2427 0          TCF    POLFOUND    IF C(A) IS NOT +0, IT IS POSITIVE AND
 0095                      20,2370  0 0006 1          EXTEND             FIRST THE RELATIVE ADDRESS INDEXER IS
 0096  REF   3 LAST 556    20,2371  26 063 0          DIM    POLREFLOC   DECREMENTED BY ONE FOR THE NEXT POLICY.
 0097  REF   2 LAST 555    20,2372  10 064 1          CCS    LOOPCTR     THEN A CHECK IS MADE FOR ANY MORE USABLE
 0098  REF   1             20,2373  1 2354 0          TCF    BESTPOLS    POLICIES, IF NO MORE, C(LOOPCTR) = +0.
```

R0099 ***** JET FAILURE ABORT SEQUENCE. *****

```
 0100  REF 189 LAST 555    20,2374  3 7767 0 ABORTJET CAF    ZERO        TURN OFF ALL JETS.
 0101                      20,2375  0 0006 1          EXTEND
 0102                      20,2376  01 005 0          WRITE  5
 0103                      20,2377  0 0006 1          EXTEND
 0104                      20,2400  01 006 0          WRITE  6

 0105  REF   3 LAST 315    20,2401  3 5660 1          CAF    PRIO27      ABORT PRIORITY.
 0106  REF  19 LAST 497    20,2402  0 5505 1          TC     NOVAC       CALL JETABORT THROUGH EXECUTIVE.
 0107  REF  11 LAST 555                 E6           EBANK= JTSONNOW
 0108                      20,2403   02113 0         2CADR  JETABORT
C0108  REF   1             20,2404   16066 0
 0109  REF   5 LAST 496    20,2405  4 7751 1          CS     GODAPGO     SET GODAPGO TO TURN LM DAP OFF WHEN THIS
 0110  REF  44 LAST 555    20,2406  7 0077 0          MASK   DAPBOOLS    BIT IS CHECKED IN THE NEXT P-AXIS RUPT.
 0111  REF  45 LAST 556    20,2407  54 077 0          TS     DAPBOOLS

 0112  REF  35 LAST 551    20,2410  1 5733 1          TCF    RESJME
```

R01125 ***** END JET FAILURE ABORT SEQUENCE. *****

L Q,R-AXES JET SELECT AND FAILURE CONTROL LOGIC USER'S OWN PAGE NO. 4 53 E6

```
P0113   ENTER HERE AFTER ULLAGE/ASCENT DETECTION:

 0114   REF  46 LAST 556     20,2411  4 0077 0  +XSELECT CS    DAPBOOLS   CHECK FOR ULLAGE  BIT6/DAPBOOLS =1.
 0115   REF   4 LAST 496     20,2412  7 7756 0           MASK  ULLAGER    IF THE ULLAGE BIT IS 0, THEN THE LM IS
 0116   REF 250 LAST 556     20,2413  10 000 0           CCS   A           IN AN ASCENT BURN AND NO +X TRANSLATION
 0117   REF   1              20,2414  1 2417 0           TCF   +XSENSE     HAS BEEN REQUESTED (SEE ULL/+X).

R0118   ENTER HERE FOR +X TRANSLATION:

 0119   REF  10 LAST 528     20,2415  3 7745 0  +XTRANSL CAF   NEGMAX     INDICATE +X TRANSLATION FOR CCS LATER.
 0120   REF   3 LAST 555     20,2416  54 071 0           TS    ANYTRANS   (ANYTRANS IS A VOLATILE SWITCH.)

R0121   ENTER HERE FOR +X SENSE JETS:

 0122   REF   3 LAST 555     20,2417  50 061 0  +XSENSE  INDEX  NETACNDX   PICK UP +X SENSE TABLE INDEX AND THE
 0123   REF   1              20,2420  3 2646 1           CAF   +SENSTAB    NUMBER OF ALTERNATE POLICIES TO CHECK.

 0124   REF   1              20,2421  1 2346 0           TCF   NUMBALTS    GO TO BEGIN FAILURE CHECKING (ROTATION).

R0125   ENTER HERE FOR -X TRANSLATION:

 0126   REF  34 LAST 545     20,2422  3 7743 0  -XSENSE  CAF   POSMAX     INDICATE -X TRANSLATION FOR CCS LATER.
 0127   REF   4 LAST 557     20,2423  54 071 0           TS    ANYTRANS   (ANYTRANS IS A VOLATILE SWITCH.)

 0128   REF   4 LAST 557     20,2424  50 061 0           INDEX NETACNDX   PICK UP -X SENSE TABLE INDEX AND THE
 0129   REF   1              20,2425  3 2666 0           CAF   -SENSTAB    NUMBER OF ALTERNATE POLICIES TO CHECK.

 0130   REF   2 LAST 557     20,2426  1 2346 0           TCF   NUMBALTS    GO TO BEGIN FAILURE CHECKING (ROTATION).

R0131   ENTER HERE AFTER A ROTATION POLICY HAS BEEN FOUND:

 0132   REF   2 LAST 556     20,2427  30 065 1  POLFOUND CAE   THISPOLY   GET POSITIVE-VALUED POLICY TABLE ENTRY
 0133                        20,2430  0 0006 1           EXTEND            WHICH IS INSURED AGAINST FAILURE.
 0134   REF  32 LAST 526     20,2431  7 7760 0           MP    BIT4       UNPACK BITS 12-14 OF TABLE ENTRY GET THE
 0135   REF 251 LAST 557     20,2432  50 000 1           INDEX A           NUMBER OF Q-AXIS JETS FROM TORQUE TABLE.
 0136   REF   1              20,2433  3 2607 1           CAF   TORQTABL    SAVE FOR TORQUE VECTOR RECONSTRUCTION
 0137   REF   3 LAST 549     20,2434  55'607 0           TS    NO.QJETS    AND FOR DETERMINING 1/NETACC.

 0138   REF 107 LAST 555     20,2435  30 001 0           CAE   L           UNPACK BITS 9-11 OF TABLE ENTRY WHICH
 0139                        20,2436  0 0006 1           EXTEND            ARE NOW BITS 12-14 OF THE L-REGISTER.
 0140   REF  33 LAST 557     20,2437  7 7760 0           MP    BIT4        (BIT15 OF L IS 0 DUE TO SIGN AGREEMENT.)
 0141   REF 252 LAST 557     20,2440  50 000 1           INDEX A           GET NUMBER OF R-AXIS JETS FROM TORQUE
 0142   REF   2 LAST 557     20,2441  3 2607 1           CAF   TORQTABL    TABLE.  SAVE FOR TORQUE VECTOR RECON-
 0143   REF   2 LAST 549     20,2442  55'610 0           TS    NO.RJETS    STRUCTION AND FOR GETTING 1/NETACC.

R0144   PICK OUT ROTATION JETS FROM TABLE ENTRY:

 0145   REF   3 LAST 557     20,2443  30 065 1           CAE   THISPOLY    UNPACK BITS 1-8 OF TABLE ENTRY (DONE
 0146   REF   9 LAST 408     20,2444  7 4564 0           MASK  LOWB        MOST EASILY BY THE MASKING OPERATION).
 0147   REF  33 LAST 530     20,2445  6 7745 0           AD    BIT15       SET SIGN TO INDICATE Q,R-AXES JETS.
```

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0148 REF 12 LAST 556 20,2446 55+471 0 TS JTSONNOW SET POLICY UP FOR IMMEDIATE USE.

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P0149 ENTRY POINT FOR +X TRANS. OR -X TRANS. REQUEST ALONE:

R01495 (ALSO CONTINUATION OF TRANSLATION-WITH-ROTATION LOGIC.)

```
0150  REF  71 LAST 541    20,2447  3 7762 0  +/-XTRAN CAF    TWO          SET UP LOOP TO TEST ALL THREE POSSIBLE
0151  REF   3 LAST 556    20,2450  54 064 1           TS     LOOPCTR      TRANSLATION POLICIES, IF 4 JETS ASKED.

0153  REF   5 LAST 557    20,2451  10 071 0           CCS    ANYTRANS     TEST FOR TRANSLATION REQUESTS: -0 UNUSED
0154  REF   1              20,2452  1 2456 0           TCF    -XPOLICY     POSMAX: -X TRANSLATION.
0155  REF   1              20,2453  1 2543 0           TCF    LATERJET     +ZERO: NO TRANSLATION.

R0156 ENTER HERE FOR +X TRANSLATION POLICIES:

0157  REF  72 LAST 559    20,2454  3 7762 0  +XPOLICY CAF    TWO          NEGMAX: +X TRANSLATION.
0158                      20,2455  1 2457 1           TCF    +2           SET POLRELOC FOR +X TRANS. INDEXING.

R0159 ENTER HERE FOR -X TRANSLATION POLICIES:

0160  REF  15 LAST 541    20,2456  3 7766 1  -XPOLICY CAF    FIVE         SET POLRELOC FOR -X TRANS. INDEXING.
0161  REF   4 LAST 556    20,2457  54 063 0           TS     POLRELOC     (INITIAL VALUE ALWAYS FOR 4-JET POLICY.)

R0162 TEST FOR TRANSLATION TO BE COMBINED WITH ROTATION JETS.

0163  REF   4 LAST 556    20,2460  10 072 0           CCS    TRANSNOW     TEST IF TRANSLATION WITH ROTATION IS
0164  REF   1              20,2461  1 2526 0           TCF    TRANCONT     REQUESTED, IF SO, OVER-RIDE 4-JET TEST.

R0165 DETERMINE IF LM DAP IS IN 2 OR 4 JET TRANSLATION MODE:

0166  REF  47 LAST 557    20,2462  4 0077 0           CS     DAPBOOLS     TEST FOR 2/4-JET TRANSLATION MODE IN
0167  REF   1              20,2463  7 7760 0           MASK   ACC4OR2X     BIT4/DAPBOOLS (ASTRONAUT DSKY INPUT)
0168  REF 253 LAST 557    20,2464  10 000 0           CCS    A            0: 2 JET MODE (SKIP OUT).
0169  REF   2 LAST 559    20,2465  1 2526 0           TCF    TRANCONT     1: 4 JET MODE (CONTINUE).

R0170 TEST TRANSLATION POLICIES FOR JET FAILURES:

0171  REF   5 LAST 559    20,2466  50 063 1  TRANNEXT INDEX  POLRELOC     PICK UP POLICY FOR +/-X TRANSLATION
0172  REF   1              20,2467  3 2676 1           CAF    TRANPOLY     FROM TABLE (INDEXED WITHIN REQUESTED
0173  REF   4 LAST 557    20,2470  54 065 0           TS     THISPOLY     RANGE OF POLICIES); TEST FOR FAILURES
0174  REF   3 LAST 556    20,2471  7 0102 0           MASK   CH5MASK      IF NO FAILURES, C(A) = +0.  IF POLICY
0175  REF 254 LAST 559    20,2472  10 000 0           CCS    A            CANNOT BE USED, C(A) IS POSITIVE.
0176  REF   1              20,2473  1 2524 1           TCF    TRANCNTD     IF FAILED, CHECK FOR STORE GOOD TRANS.

R0177 SPECIAL TESTS ARE NEEDED FOR TRANSLATION DURING ROTATION:

0178  REF   5 LAST 559    20,2474  10 072 0           CCS    TRANSNOW     TEST FOR TRANSLATION DURING ROTATION
0179  REF   1              20,2475  1 2514 1           TCF    TRANSTOR     IF SO, GO TEST THIS POLICY FOR USE NOW.

R0180 TEST FOR ONLY TRANSLATION REQUEST:

0181  REF   3 LAST 555    20,2476  10 070 1           CCS    TRANONLY     TEST FOR PURE TRANSLATION REQUEST
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 0182   REF   1                20,2477  1 2510 0          TCF     TRANoROT        IF SO, GIVE TRANSLATION, NO ROTATION

R0183   SPECIAL TEST FOR GOOD 4-JET TRANSLATION:

 0184   REF  73 LAST 559       20,2500  4 7762 1          CS      TWO             TEST IF POLICY IS USING FOUR JETS (WHICH
 0185   REF   4 LAST 559       20,2501  6 0064 0          AD      LOOPCTR         IS EQUIVALENT TO LOOPCTR = 2).  IF 4-JET
 0186                          20,2502  0 0006 1          EXTEND                  THIS POLICY MUST BE USED AS JTSATCHG.
 0187   REF   1                20,2503  1 2506 1          BZF     TRAN4JET        OTHERWISE, MUST CHECK TRANSAVE FIRST.

R0188   WHEN NOT 4-JET TRANSLATION, CHECK FOR SAVED POLICY:

 0189   REF   3 LAST 555       20,2504  10 073 1          CCS     TRANSAVE        TEST FOR SAVED POLICY; IF SAVED, USE IT.
 0190   REF   1                20,2505  1 2542 1          TCF     TRANUSED        IF NOT SAVED YET, USE THIS POLICY.

R0191   USE THIS POLICY (EITHER 4 JETS OR BEST 2 JET):

 0192   REF   5 LAST 559       20,2506  30 065 1  TRAN4JET CAE     THISPOLY        USE THIS UNFAILED POLICY AS THE TRANS-
 0193   REF   2 LAST 559       20,2507  1 2543 0          TCF     LATERJET        LATION POLICY AFTER ROTATION.

R0194   FOR TRANSLATION WITHOUT ROTATION, TURN JETS ON IMMEDIATELY AND RESUME:

 0195   REF   6 LAST 560       20,2510  30 065 1  TRANORJT CAE     THISPOLY        TURN ON UNFAILED Q,R-AXES JETS AS A PURE
 0196                          20,2511  0 0006 1          EXTEND                  TRANSLATION POLICY WITHOUT ANY TJETLAW
 0197                          20,2512  01 005 0          WRITE   5               CALCULATIONS (AND NO TIME6 SETTING).

 0198   REF  36 LAST 556       20,2513  1 5733 1          TCF     RESUME          END T5RUPT SINCE JETS ON FOR FULL CSP.

R0199   TEST THIS TRANSLATION FOR USE DURING ROTATION:

 0200   REF   7 LAST 560       20,2514  30 065 1  TRANSTOR CAE     THISPOLY        SAVE THIS POLICY FOR LATER USE AS THE
 0201   REF   4 LAST 560       20,2515  54 073 1          TS      TRANSAVE        JTSATCHG POLICY UNLESS IT IS SUPERCEDED.
 0202   REF  13 LAST 558       20,2516  7 1471 0          MASK    JTSONNOW        TEST FOR USE WITH ROTATION POLICY  MUST
 0203   REF 255 LAST 559       20,2517  10 000 0          CCS     A               HAVE NO JETS IN COMMON WITH JTSONNOW.
 0204   REF   3 LAST 559       20,2520  1 2526 0          TCF     TRANCONT        C(A) POSITIVE MEANS POLICIES CONFLICT.

R0205   COINCIDENT TRANSLATION FOUND, GO FIND PURE TRANSLATION POLICY (FOR USE AFTER ROTATION):

 0207   REF   8 LAST 560       20,2521  30 065 1          CAE     THISPOLY        USE BOTH ROTATION AND TRANSLATION JETS
 0208   REF  14 LAST 560       20,2522  27'471 0          ADS     JTSONNOW        AS JTSONNOW (BIT 15 IS ALREADY SET).

 0209   REF   1                20,2523  1 2535 1          TCF     TRANSLAT        GO TO START FINDING JTSATCHG POLICY.

R0210   STOP SEARCH IF GOOD TRANSLATION POLICY ALREADY RECORDED:

 0211   REF   5 LAST 560       20,2524  10 073 1  TRANCNTD CCS     TRANSAVE        TEST FOR PREVIOUSLY SAVED TRANSLATION
 0212   REF   2 LAST 560       20,2525  1 2542 1          TCF     TRANUSED        POLICY, IF IT EXISTS, USE IT.

R0213   CONTINUE FAILURE CHECKING LOOP:

 0214                          20,2526  0 0006 1  TRANCONT EXTEND                  CONTINUE THE TRANSLATION-FAIL LOOP
```

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0215  REF   6 LAST 559     20,2527  26 063 0          DIM    POLRELOC    DECREMENT THE TRANSLATION POLICY INDEX
0216  REF   5 LAST 560     20,2530  10 064 1          CCS    LOOPCTR     AND THEN TEST LOOPCTR FOR CONTINUATION
0217  REF   1               20,2531  1 2540 0          TCF    TRNRESET    OF JET FAILURE TESTING.

R0218 IF NO TRANSLATION CAN BE FOUND FOR ROTATION POLICY, ALL IS NOT LOST, OTHERWISE, START JET FAILURE ABORT:

0220  REF   6 LAST 559     20,2532  10 072 0          CCS    TRANSNOW    IF FAILURES STOP TRANSLATION DURING
0221  REF   2 LAST 560     20,2533  1 2535 1          TCF    TRANSLAT    ROTATION, CONTINUE BY FINDING JTSATCHG.

0222  REF   2 LAST 502     20,2534  1 2374 1          TCF    ABORTJET    TURN OFF JETS AND ABORT.

R0223 BEGIN SEARCH FOR JTSATCHG POLICY:

0224  REF 190 LAST 556     20,2535  3 7767 0  TRANSLAT CAF    ZERO        SET VOLATILE FLAG TO INDICATE SEARCH IS
0225  REF   7 LAST 561     20,2536  54 072 0          TS     TRANSNOW    FOR JTSATCHG, AFTER TRANSNOW DONE.

0226  REF   2 LAST 528     20,2537  1 2447 0          TCF    +/-XTRAN    GO TO RE-INITIALIZE LOOP FROM SCRATCH.

R0227 "TOP OF LOOP" (FOR ALL BUT FIRST PASS):

0228  REF   6 LAST 561     20,2540  54 064 1  TRNRESET TS     LOOPCTR     RESET LOOP COUNTER TO CONTINUE LOOPING
0229  REF   1               20,2541  1 2466 0          TCF    TRANNEXT    GO TO CONTINUATION OF LOOP (AT THE TOP).

R0230 RECONSTRUCT FLAGGED JET POLICY:

0231  REF 135 LAST 543     20,2542  6 7763 1  TRANUSED AD     ONE         RESET POLICY THAT WAS POSITIVE AND CCSED
0232  REF  34 LAST 557     20,2543  6 7745 0  LATERJET AD     BIT15       SET BIT 15 TO INDICATE Q,R-AXES POLICY.
0233  REF  11 LAST 530     20,2544  55,472 0          TS     JTSATCHG    USE FOR JTSATCHG TRANSLATION POLICY.

R0234 TRANSFORM INITIAL POINTER TO 2-JET POLICY:

0235  REF 136 LAST 561     20,2545  3 7763 1          CAF    ONE         FROM THE INDEX VALUE INDICATING NUMBER
0236  REF   5 LAST 557     20,2546  7 0061 1          MASK   NETACNDX    OF JETS, DIRECTION, AND AXIS, COMPUTE
0237  REF 256 LAST 560     20,2547  10 000 0          CCS    A           THE INDEX VALUE FOR 2 JETS ABOUT THAT
0238                       20,2550  1 2553 1          TCF    +3          AXIS (IN THAT DIRECTION).  CONTRIVANCE
0239                       20,2551  0 0006 1          EXTEND             MAKES THIS EQUIVALENT TO  IF BIT1 IS ON,
0240  REF   6 LAST 561     20,2552  24 061 0          AUG    NETACNDX    (INDEP. OF SIGN)  AUGMENT  NETACNDX.

R0241 TRANSFORM POINTER TO CORRESPOND TO JETS ACTUALLY CHOSEN.

0242  REF   4 LAST 557     20,2553  11,607 0          CCS    NO.QJETS    TRANSFORM INDEX TO APPROPRIATE VALUE FOR
0243                       20,2554  1 2556 1          TCF    +2          THE NUMBER OF JETS SELECTED.
0244  REF   1               20,2555  1 2567 0          TCF    ALLRJETS    IF NO.QJETS ZERO, NO.RJETS IS NONZERO.
0245  REF 257 LAST 561     20,2556  10 000 0          CCS    A           IF NO.QJETS +/-1, NO.RJETS IS +/-1 (BY
0246                       20,2557  1 2561 0          TCF    +2          DEFINITION)  SO SUBTRACT ONE FROM INDEX.
0247  REF   1               20,2560  1 2564 0          TCF    SMALAXIS    GO TRANSFORM FOR 1 U,V-AXIS JET.
0248  REF 258 LAST 561     20,2561  10 000 0          CCS    A           IF STILL NONZERO ON THIRD CCS, NO.QJETS
0249  REF   7 LAST 561     20,2562  24 061 0          INCR   NETACNDX    MUST HAVE BEEN +/-4, SO ADD ONE TO THE
0250  REF   1               20,2563  1 2576 0          TCF    NETACGET    INDEX, OTHERWISE, NO CHANGE (2 JETS).
```

L Q,R-AXES JET SELECT AND FAILURE CONTROL LOGIC USER'S OWN PAGE NO. 9 S3 E6

```
0251                        20,2564  0 0006 1  SMALAXIS EXTEND                 DECREMENT INDEX FOR 1 JET AROUND EITHER
0252  REF   8 LAST 561     20,2565  26 061 1            DIM    NETACNDX       THE U- OR V- AXIS.
0253  REF   2 LAST 561     20,2566  1 2576 0            TCF    NETACGET       (GO PICK UP INVERSE OF NET ACCELERATION)

0254  REF   3 LAST 557     20,2567  11'610 0  ALLRJETS  CCS    NO.RJETS       WHEN NO.QJETS ZERO, TEST NO.RJETS WHICH
0255  REF  74 LAST 560     20,2570  7 7762 1            MASK   TWO            IS ONLY +/-2 OR +/-4.  NOTE LAST THREE
0256                        20,2571  1 2573 0            TCF    +2             BITS OF THESE AFTER CCS  001 OR 011.
0257  REF  75 LAST 562     20,2572  7 7762 1            MASK   TWO            ONLY BIT2 DISTINGUISHES BETWEEN THE TWO.
0258                        20,2573  0 0006 1            EXTEND                IF BIT2 = 0, THEN TWO JETS, NO CHANGE.
0259                        20,2574  1 2576 0            BZF    +2             IF BIT2 = 1, THEN FOUR JETS, SO THE
0260  REF   9 LAST 562     20,2575  24 061 0            INCR   NETACNDX       INDEX MUST BE INCREMENTED.

R0261 PICK UP AND SAVE 1/NETACC FOR TJETLAW:

0262  REF  10 LAST 562     20,2576  50 061 0  NETACGET INDEX  NETACNDX       USE THE INDEX VALUE FOR THE EXACT JETS
0263  REF   1              20,2577  31'706 1            CAE    1/NETACS       USED, PICK UP THE APPROPRIATE 1/NETACC
0264  REF   8 LAST 551     20,2600  54 066 0            TS     1/NETACC       AND SAVE FOR USE BY THE TJETLAW.

R0265 RETURN TO APPROPRIATE TJETLAW:

0266  REF   1              20,2601  3 2605 0            CAF    BBANKSET       ALWAYS RETURN TO THE FIXED BANK OF THE
0267  REF 108 LAST 557     20,2602  54 001 1            TS     L              Q,R-AXES REACTION CONTROL SYSTEM LM DAP.
0268  REF   2 LAST 535     20,2603  30 062 0            CAE    TJETADR        USE VARIABLE GENADR WITH WHICH TO
0269                        20,2604  52 006 0            DTCB                  CROSS BANKS TO RETURN.

0270  REF   8 LAST 549                 E6               EBANK= DMEGAQ
0271  REF   2 LAST 518     20,2605    36066 1  BBANKSET BBCON  QRAXIS         BBCON OF Q,R-AXES RCS LM DAP.

0272                        20,2606  00240 1  BITS668  OCTAL  00240           ULLAGE AND ASCENT BURN DAPBOOLS BITS.
```

L Q,R-AXES JET SELECT AND FAILURE CONTROL LOGIC USER'S OWN PAGE NO. 10 S3 E6

P0273 TABLE OF Q,R-JET NUMBERS AND DIRECTIONS:

```
0274                    20,2607  00000 1  TORKTABL DEC    0          FROM THE 3 PACKED BITS IN A WORD FROM
0275                    20,2610  00001 0           DEC    +1         POLTABLE, THE POLTYPEP PROGRAM SELECTS
0276                    20,2611  77776 1           DEC    -1         THE APPROPRIATE NO.QJETS OR NO.RJETS
0277                    20,2612  00002 0           DEC    +2         AS FOLLOWS:
0278                    20,2613  77775 1           DEC    -2         000: NO JETS
0279                    20,2614  00004 0           DEC    +4         001: +1 JET   011: +2 JETS  101: +4 JETS
0280                    20,2615  77773 1           DEC    -4         010: -1 JET   100: -2 JETS  110: -4 JETS
```

R0281 RELATIVE ADDRESSES AND NUMBER OF ALTERNATE POLICIES ARE LISTED IN THE FOLLOWING TABLES. EACH ENTRY HAS THE FORM
R0283 OXYYY WHERE X INDICATES THE NUMBER OF ALTERNATE POLICIES AND
R0284 YYY IS THE RELATIVE ADDRESS IN POLTABLE OF THE "OPTIMAL" POLICY.

R0286 FORCE-COUPLE POLICIES:

```
0287                    20,2616  03003 1           OCTAL  03003      +2 Q-AXIS JETS
0288                    20,2617  04004 1           OCTAL  04004      +4 Q-AXIS JETS
0289                    20,2620  03010 0           OCTAL  03010      -2 Q-AXIS JETS
0290                    20,2621  04011 0           OCTAL  04011      -4 Q-AXIS JETS
0291                    20,2622  03015 0           OCTAL  03015      +2 R-AXIS JETS
0292                    20,2623  04016 1           OCTAL  04016      +4 R-AXIS JETS
0293                    20,2624  03022 1           OCTAL  03022      -2 R-AXIS JETS
0294                    20,2625  04023 1           OCTAL  04023      -4 R-AXIS JETS
0295                    20,2626  02026 1  NORMLPOL OCTAL  02026      +2 U-AXIS JETS
0296                    20,2627  02026 1           OCTAL  02026      +2 U-AXIS JETS
0297                    20,2630  02031 1           OCTAL  02031      -2 U-AXIS JETS
0298                    20,2631  02031 1           OCTAL  02031      -2 U-AXIS JETS
0299                    20,2632  02034 1           OCTAL  02034      +2 V-AXIS JETS
0300                    20,2633  02034 1           OCTAL  02034      +2 V-AXIS JETS
0301                    20,2634  02037 1           OCTAL  02037      -2 V-AXIS JETS
0302                    20,2635  02037 1           OCTAL  02037      -2 V-AXIS JETS
```

L Q+R-AXES JET SELECT AND FAILURE CONTROL LOGIC USER'S OWN PAGE NO. 11 S3 E6

```
P0303   +X SENSE POLICIES:

0304                20,2636  03043 0          OCTAL  03043   +2 Q-AXIS JETS
0305                20,2637  04044 0          OCTAL  04044   +4 Q-AXIS JETS
0306                20,2640  03050 1          OCTAL  03050   -2 Q-AXIS JETS
0307                20,2641  04051 1          OCTAL  04051   -4 Q-AXIS JETS
0308                20,2642  03055 1          OCTAL  03055   +2 R-AXIS JETS
0309                20,2643  04056 0          OCTAL  04056   +4 R-AXIS JETS
0310                20,2644  03062 0          OCTAL  03062   -2 R-AXIS JETS
0311                20,2645  04063 0          OCTAL  04063   -4 R-AXIS JETS
0312                20,2646  01025 1 +SENSTAB OCTAL  01025   +1 U-AXIS JETS
0313                20,2647  02026 1          OCTAL  02026   +2 U-AXIS JETS
0314                20,2650  01030 0          OCTAL  01030   -1 U-AXIS JETS
0315                20,2651  02031 1          OCTAL  02031   -2 U-AXIS JETS
0316                20,2652  01033 0          OCTAL  01033   +1 V-AXIS JETS
0317                20,2653  02034 1          OCTAL  02034   +2 V-AXIS JETS
0318                20,2654  01036 0          OCTAL  01036   -1 V-AXIS JETS
0319                20,2655  02037 1          OCTAL  02037   -2 V-AXIS JETS

R0320   -X SENSE POLICIES:

0321                20,2656  03067 0          OCTAL  03067   +2 Q-AXIS JETS
0322                20,2657  04070 1          OCTAL  04070   +4 Q-AXIS JETS
0323                20,2660  03074 1          OCTAL  03074   -2 Q-AXIS JETS
0324                20,2661  04075 1          OCTAL  04075   -4 Q-AXIS JETS
0325                20,2662  03101 1          OCTAL  03101   +2 R-AXIS JETS
0326                20,2663  04102 0          OCTAL  04102   +4 R-AXIS JETS
0327                20,2664  03106 0          OCTAL  03106   -2 R-AXIS JETS
0328                20,2665  04107 0          OCTAL  04107   -4 R-AXIS JETS
0329                20,2666  01111 1 -SENSTAB OCTAL  01111   +1 U-AXIS JETS
0330                20,2667  02112 1          OCTAL  02112   +2 U-AXIS JETS
0331                20,2670  01114 1          OCTAL  01114   -1 U-AXIS JETS
0332                20,2671  02115 0          OCTAL  02115   -2 U-AXIS JETS
0333                20,2672  01117 1          OCTAL  01117   +1 V-AXIS JETS
0334                20,2673  02120 0          OCTAL  02120   +2 V-AXIS JETS
0335                20,2674  01122 1          OCTAL  01122   -1 V-AXIS JETS
0336                20,2675  02123 0          OCTAL  02123   -2 V AXIS JETS
```

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P0337 X-AXIS TRANSLATION POLICIES:

```
0338                20,2676  00042 1  TRANPOLY OCTAL  +00042     2 10        * +X TRANSLATION JETS    0
0339                20,2677  00210 1           OCTAL  +00210     6 14        *                        1
0340                20,2700  00252 1           OCTAL  +00252     2  6 10 14  *                        2

0341                20,2701  00104 1           OCTAL  +00104     3 13        * -X TRANSLATION JETS    3
0342                20,2702  00021 1           OCTAL  +00021     1  9        *                        4
0343                20,2703  00125 1           OCTAL  +00125     1  5  9 13  *                        5
```

L Q,R-AXES JET SELECT AND FAILURE CONTROL LOGIC USER'S OWN PAGE NO. 13 S3 E6

P0344 ROTATION JET POLICIES:

R0345 FORCE COUPLE POLICIES:

```
0346                20,2704   14025 0  POLTABLE OCTAL  +14025     5  9          * +Q-AXIS FORCE COUPLES      0
0347                20,2705   14203 0           OCTAL  +14203     2 14          *                           1
0348                20,2706   14221 0           OCTAL  +14221     9 14          *                           2
0349                20,2707   14007 0           OCTAL  +14007     2  5          *                           3
0350                20,2710   24227 0           OCTAL  +24227     2  5  9 14    *                           4

0351                20,2711   20051 1           OCTAL  +20051     6 10          * -Q-AXIS FORCE-COUPLES      5
0352                20,2712   20102 0           OCTAL  +20102     1 13          *                           6
0353                20,2713   20141 1           OCTAL  +20141    10 13          *                           7
0354                20,2714   20012 0           OCTAL  +20012     1  6          *                          10
0355                20,2715   30152 1           OCTAL  +30152     1  6 10 13    *                          11

0356                20,2716   01641 0           OCTAL  +01641    10 14          * +R-AXIS FORCE-COUPLES      12
0357                20,2717   01406 1           OCTAL  +01406     1  5          *                          13
0358                20,2720   01445 0           OCTAL  +01445     5 10          *                          14
0359                20,2721   01602 1           OCTAL  +01602     1 14          *                          15
0360                20,2722   02646 1           OCTAL  +02646     1  5 10 14    *                          16

0361                20,2723   02121 1           OCTAL  +02121     9 13          * -R-AXIS FORCE-COUPLES      17
0362                20,2724   02013 1           OCTAL  +02013     2  6          *                          20
0363                20,2725   02103 1           OCTAL  +02103     2 13          *                          21
0364                20,2726   02031 1           OCTAL  +02031     6  9          *                          22
0365                20,2727   03133 0           OCTAL  +03133     2  6  9 13    *                          23
```

R0366 FORCE COUPLE AND +X SENSE POLICIES:

```
0367                20,2730   73372 0           OCTAL  -04405     5             * +U-AXIS FORCE-COUPLES      24
0368                20,2731   73176 0           OCTAL  -04601    14             *     AND +X SENSE           25
0369                20,2732   62172 1           OCTAL  -15605     5 14          *                          26

0370                20,2733   66676 0           OCTAL  -11101    13             * -U-AXIS FORCE-COUPLES      27
0371                20,2734   66766 0           OCTAL  -11011     6             *     AND +X SENSE           30
0372                20,2735   55666 1           OCTAL  -22111     6 13          *                          31

0373                20,2736   67375 1           OCTAL  -10402     1             * +V-AXIS FORCE-COUPLES      32
0374                20,2737   67336 0           OCTAL  -10441    10             *     AND +X SENSE           33
0375                20,2740   56335 1           OCTAL  -21442     1 10          *                          34

0376                20,2741   72756 0           OCTAL  -05021     9             * -V-AXIS FORCE-COUPLES      35
0377                20,2742   72774 0           OCTAL  -05003     2             *     AND +X SENSE           36
0378                20,2743   61754 0           OCTAL  -16053     2  9          *                          37
```

L Q,R-AXES JET SELECT AND FAILURE CONTROL LOGIC USER'S OWN PAGE NO. 14 S3 E6

```
P0379   +X SENSE POLICIES:

0380                20,2744   14025 0     OCTAL  +14025     5  9        *  +Q-AXIS +X SENSE JETS   40
0381                20,2745   14221 0     OCTAL  +14221     9 14        *                          41
0382                20,2746   14007 0     OCTAL  +14007     2  5        *                          42
0383                20,2747   14203 0     OCTAL  +14203     2 14        *                          43
0384                20,2750   24227 0     OCTAL  +24227     2  5  9 14  *                          44

0385                20,2751   20102 0     OCTAL  +20102     1 13        *  -Q-AXIS +X SENSE JETS   45
0386                20,2752   20141 1     OCTAL  +20141    10 13        *                          46
0387                20,2753   20012 0     OCTAL  +20012     1  6        *                          47
0388                20,2754   20051 1     OCTAL  +20051     6 10        *                          50
0389                20,2755   30152 1     OCTAL  +30152     1  6 10 13  *                          51

0390                20,2756   01406 1     OCTAL  +01406     1  5        *  +R-AXIS +X SENSE JETS   52
0391                20,2757   01445 0     OCTAL  +01445     5 10        *                          53
0392                20,2760   01602 1     OCTAL  +01602     1 14        *                          54
0393                20,2761   01641 0     OCTAL  +01641    10 14        *                          55
0394                20,2762   02646 1     OCTAL  +02646     1  5 10 14  *                          56

0395                20,2763   02121 1     OCTAL  +02121     9 13        *  -R-AXIS +X SENSE JETS   57
0396                20,2764   02103 1     OCTAL  +02103     2 13        *                          60
0397                20,2765   02031 1     OCTAL  +02031     6  9        *                          61
0398                20,2766   02013 1     OCTAL  +02013     2  6        *                          62
0399                20,2767   03133 0     OCTAL  +03133     2  6  9 13  *                          63
```

L Q,R-AXES JET SELECT AND FAILURE CONTROL LOGIC USER'S OWN PAGE NO. 15 S3 E6

P0400 -X SENSE POLICIES:

```
0401          20,2770  14203 0    OCTAL  +14203    2 14          * +Q-AXIS -X SENSE JETS   64
0402          20,2771  14221 0    OCTAL  +14221    9 14          *                        65
0403          20,2772  14007 0    OCTAL  +14007    2  5          *                        66
0404          20,2773  14025 0    OCTAL  +14025    5  9          *                        67
0405          20,2774  24227 0    OCTAL  +24227    2  5  9 14    *                        70

0406          20,2775  20051 1    OCTAL  +20051    6 10          * -Q-AXIS -X SENSE JETS   71
0407          20,2776  20141 1    OCTAL  +20141   10 13          *                        72
0408          20,2777  20012 0    OCTAL  +20012    1  6          *                        73
0409          20,3000  20102 0    OCTAL  +20102    1 13          *                        74
0410          20,3001  30152 1    OCTAL  +30152    1  6 10 13    *                        75

0411          20,3002  01641 0    OCTAL  +01641   10 14          * +R-AXIS -X SENSE JETS   76
0412          20,3003  01445 0    OCTAL  +01445    5 10          *                        77
0413          20,3004  01602 1    OCTAL  +01602    1 14          *                       100
0414          20,3005  01406 1    OCTAL  +01406    1  5          *                       101
0415          20,3006  02646 1    OCTAL  +02646    1  5 10 14    *                       102

0416          20,3007  02013 1    OCTAL  +02013    2  6          * -R-AXIS -X SENSE JETS  103
0417          20,3010  02103 1    OCTAL  +02103    2 13          *                       104
0418          20,3011  02031 1    OCTAL  +02031    6  9          *                       105
0419          20,3012  02121 1    OCTAL  +02121    9 13          *                       106
0420          20,3013  03133 0    OCTAL  +03133    2  6  9 13    *                       107

0421          20,3014  73176 0    OCTAL  -04601   14            * +U-AXIS -X SENSE JETS  110
0422          20,3015  73372 0    OCTAL  -04405    5            *                       111
0423          20,3016  62172 1    OCTAL  -15605    5 14          *                       112

0424          20,3017  66766 0    OCTAL  -11011    6            * -U-AXIS -X SENSE JETS  113
0425          20,3020  66676 0    OCTAL  -11101   13            *                       114
0426          20,3021  55666 1    OCTAL  -22111    6 13          *                       115

0427          20,3022  67336 0    OCTAL  -10441   10            * +V-AXIS -X SENSE JETS  116
0428          20,3023  67375 1    OCTAL  -10402    1            *                       117
0429          20,3024  56335 1    OCTAL  -21442    1 10          *                       120

0430          20,3025  72774 0    OCTAL  -05003    2            * -V-AXIS -X SENSE JETS  121
0431          20,3026  72756 0    OCTAL  -05021    9            *                       122
0432          20,3027  61754 0    OCTAL  -16023    2  9          *                       123
```

```
L       RCS FAILURE MONITOR                                     USER'S OWN PAGE NO.  1          S3

R0005   PROGRAM DESCRIPTION                                     DATE: 7 JAN 67

R0010           AUTHOR:  J S MILLER     (MIT INSTRUMENTATION LAB)

R0015           THIS ROUTINE IS ATTACHED TO T4RUPT, AND IS ENTERED EVERY 960 MS.  ITS FUNCTION IS TO EXAMINE THE STATE
R0025   OF THE LOW 8 BITS OF CHAN 32 TO SEE IF RCS-JET FAILURE BITS HAVE APPEARED OR DISAPPEARED.  WHEN A STATE CHANGE
R0035   IS DETECTED WHICH PERSISTS FOR 2 SAMPLES (TO FILTER OUT NOISY SIGNALS), AN LMP COMMAND IS SENT (BUT AT MOST ONE
R0045   SUCH COMMAND PER SAMPLE) TO ISOLATE THE APPROPRIATE JET PAIR IF THE FAILURE SIGNAL HAS JUST APPEARED.  IF, ON
R0051   THE OTHER HAND, THE DISAPPEARANCE OF A FAIL-BIT IS DETECTED, THE EVENT IS PRESUMED TO BE THE RESULT OF THE
R0053   GROUND HAVING SENT AN LMP COMMAND TO OPEN THE ISOLATION VALVE AND NO SUBSEQUENT FAILURE HAVING BEEN DETECTED BY
R0055   THE DETECTION CIRCUITRY.  IN EITHER CASE, THIS FAILURE-MONITOR PROGRAM RESPONDS BY UPDATING ITS RECORD OF THE
R0057   STATE OF THE ISOLATION VALVES, AND ALSO THE PAIR OF WORDS IT MAINTAINS FOR USE BY THE DAP IN THE JET-POLICY
R0059   SELECTION LOGIC.

R0060           A FEW WORDS ABOUT LMP-RESET COMMANDS:  IN THE CYCLE IN WHICH A VALVE-CLOSURE COMMAND IS ISSUED, THE
R0062   CORRESPONDING RESET COMMAND IS STORED IN THE REGISTER "JETRESET".  THIS REGISTER IS EXAMINED AT THE BEGINNING OF
R0064   EACH RCSMONIT CYCLE, AND IF A COMMAND IS WAITING, IT IS SENT IMMEDIATELY.  THIS CAUSES RESET COMMANDS TO BE
R0066   ISSUED AT ABOUT 960 MS AFTER THE SET COMMANDS.  THIS TECHNIQUE ASSURES THAT NO MORE THAN ONE UN-RESET SET-
R0068   COMMAND IS ON AT ANY TIME (ALTHOUGH GROUND ACTIONS WILL BE SUPERIMPOSED ON THIS, HOWEVER).

R0070   CALLING SEQUENCE:

R0075           TC      RCSMONIT        (IN INTERRUPT MODE, EVERY 960 MS.)
R0080   EXIT:

R0085           TCF     RCSMONEX    (ALL PATHS EXIT VIA SUCH AN INSTRUCTION.  RCSMONEX IS PRESENTLY EQUATED TO RESUME.)

R0095   ERASABLE INITIALIZATION REQUIRED:

R0105           VIA SLAP1:  JETRESET            = -0  (RESET-CMD BUFFER EMPTY)
R0110                       THISCH32            = +0  (NO FAILURES SENSED YET)
R0115                       CH5MASK, CH6MASK    = +0  (0'S IF JETS ARE OK)
R0120                       LMPJFAIL            = +0  (ISOLATION VALVES ALL OPEN)

R0185   OUTPUT:

R0190           CH5MASK & CH6MASK UPDATED  (1'S WHERE JETS NOT TO BE USED)
R0195           THISCH32 SET TO INVERTED LOW 8 BITS OF CHAN 32 (HIGH 7 = 0)
R0200           LMPJFAIL UPDATED  (1'S WHEN ISOLATION COMMANDS HAVE BEEN SENT)
R0205           JETRESET CONTAINS RESET-COMMANDS TO BE SENT NEXT CYCLE THRU.

R0210   DEBRIS:

R0215           A, L, Q, & RCSMONT1 = 4  (PRESENTLY EQUATED TO RUPTREG1 - 4)

R0220   SUBROUTINES CALLED:

R0225           STORCOM  (PART OF 1LMP ROUTINE)
```

L RCS FAILURE MONITOR USER'S OWN PAGE NO. 2 S3

```
0230                                    12,3166          BANK   12
0235   REF  33 LAST 446                    E0           EBANK= STATE     NO SWITCHED ERASABLE USED.

0240   REF   2 LAST  88   12,3166  11'162 1  RCSMONIT CCS    JETRESET    CHECK WHETHER A RESET IS WAITING.
0245   REF   1            12,3167  0 5063 1           TC     STORCOM -1  THERE IS A RESET TO SEND.  DO IT.
0250   REF 191 LAST 561   12,3170  4 7767 1           CS     ZERO
0255   REF   3 LAST 570   12,3171  55'162 1           TS     JETRESET    DEACTIVATE THE BUFFER.

0330   REF 192 LAST 570   12,3172  4 7767 1  AFTRESET CS     ZERO
0335                      12,3173  0 0006 1           EXTEND              PICK UP & INVERT INVERTED CHANNEL 32.
0340                      12,3174  06 032 0           RXOR   32
0345   REF  10 LAST 557   12,3175  7 4564 0           MASK   LOW8        KEEP JET-FAIL BITS ONLY.
0355   REF   2 LAST  88   12,3176  57'163 1           XCH    THISCH32
0360   REF   1            12,3177  54 071 0           TS     RCSMONT2    HANG ON TO PREVIOUS CH32 STATE.

0365   REF   3 LAST 570   12,3200  7 1163 0           MASK   THISCH32          -   --
0370   REF 109 LAST 562   12,3201  54 001 1           TS     L           FORM PTL + PTL.
0375   REF   2 LAST  88   12,3202  4 0101 0           CS     LMPJFAIL      ( P = PREVIOUS CH 32 STATE,
0380   REF 110 LAST 570   12,3203  7 0001 1           MASK   L               T = THIS CH 32 STATE,
0385   REF   1            12,3204  54 072 0           TS     RCSMONT3        L = LMP ISOLATION VALVE CMD STATE )
0390   REF   2 LAST 570   12,3205  4 0071 0           CS     RCSMONT2
0395   REF 111 LAST 570   12,3206  54 001 1           TS     L
0400   REF   4 LAST 570   12,3207  4 1163 0           CS     THISCH32
0405   REF 112 LAST 570   12,3210  7 0001 1           MASK   L
0410   REF   3 LAST 570   12,3211  7 0101 0           MASK   LMPJFAIL
0415   REF   2 LAST 570   12,3212  26 072 0           ADS    RCSMONT3    BITS HERE NZ IF ACTION IS DUE NOW.

0420                      12,3213  0 0006 1           EXTEND
0425   REF   1            12,3214  1 5733 1           BZF    RCSMONEX    QUIT NOW IF NO ACTION REQUIRED.

0430                      12,3215  0 0006 1           EXTEND
0435   REF   1            12,3216  3 3221 0           DCA    RCSMONAD
0440                      12,3217  52 006 0           DTCB



0445   REF  34 LAST 570                    E0           EBANK= STATE     NO SWITCHED ERASABLE USED.
0450                      12,3220  02576 1  RCSMONAD 2CADR  RCSMON
C0450  REF   1            12,3221  54060 0
```

L RCS FAILURE MONITOR USER'S OWN PAGE NO. 3 53 E0

```
0455                                    26,2576          BANK    26

0457  REF   3 LAST 570    26,2576  3 0072 1  RCSMON   CA      RCSMONT3
0460                      26,2577  0 0006 1           EXTEND
0465  REF  30 LAST 555    26,2600  7 7755 0           MP      BIT7          MOVE BITS 8 - 1 OF A TO 14 - 7 OF L.
0470  REF 113 LAST 570    26,2601  56 001 0           XCH     L             ZERO TO L IN THE PROCESS.

0475  REF 114 LAST 571    26,2602  24 001 0  -3       INCR    L
0480                      26,2603  6 0000 1           DOUBLE                BOUND TO GET AN OVERFLOW, SINCE WE
0485                      26,2604  54 000 0           DVSK                  ASSURED INITIAL NZ IN A.
0490                      26,2605  1 2602 0           TCF     -3

0495  REF 115 LAST 571    26,2606  10 001 1           CCS     L             PICK UP C(L)-1.
0500                      26,2607  6 0000 1           DOUBLE
0505  REF   1             26,2610  54 073 1           TS      RCSMONT4      STORE FOR LATER.

0510  REF 116 LAST 571    26,2611  50 001 0           INDEX   L
0515  REF  19 LAST 555    26,2612  3 7753 1           CA      BIT8 -1
0520  REF   4 LAST 571    26,2613  54 072 0           TS      RCSMONT3      SAVE THE RELEVANT BIT (8 - 1)
0525  REF   4 LAST 570    26,2614  7 0101 0           MASK    LMPJFAIL
0530  REF 259 LAST 561    26,2615  10 000 0           CCS     A
0535  REF   1             26,2616  1 2637 0           TCF     LMPBIT=1

0540                      26,2617  0 0006 1           EXTEND                LMPBIT = 0.
0545  REF   2 LAST 571    26,2620  5 0073 0           INDEX   RCSMONT4
0550  REF   1             26,2621  3 2654 1           DCA     KILLPAIR      COMMAND TO ISOLATE A PAIR, & ITS RESET.
0552  REF   4 LAST 570    26,2622  23'162 0           XCH     JETRESET      PUT THE RESET COMMAND AWAY FOR NEXT TIME
0555  REF   2 LAST 570    26,2623  0 5064 0           TC      STORCOM       SEND THE ISOLATION COMMAND.

0560  REF   5 LAST 571    26,2624  3 0072 1           CA      RCSMONT3
0565  REF   5 LAST 571    26,2625  26 101 0           ADS     LMPJFAIL      SET THE BIT SHOWING COMMAND SENT.

0575  REF   4 LAST 559    26,2626  4 0102 0           CS      CH5MASK       SET THE JET-FAIL BITS IN CH5MASK &
0580  REF   3 LAST 571    26,2627  50 073 0           INDEX   RCSMONT4      CH6MASK.
0585  REF   1             26,2630  7 2673 0           MASK    FAILTABL
0590  REF   5 LAST 571    26,2631  26 102 0           ADS     CH5MASK

0595  REF   4 LAST 501    26,2632  4 0103 1           CS      CH6MASK
0600  REF   4 LAST 571    26,2633  50 073 0           INDEX   RCSMONT4
0605  REF   2 LAST 571    26,2634  7 2674 1           MASK    FAILTABL +1
0610  REF   5 LAST 571    26,2635  26 103 1           ADS     CH6MASK

0615  REF   2 LAST 570    26,2636  1 5733 1           TCF     RCSMONEX      DONE.
```

L RCS FAILURE MONITOR USER'S OWN PAGE NO. 4 53 E0

```
0640  REF  6 LAST 571   26,2637  4 0072 0  LMPBIT=1  CS     RCSMONT3     THE GROUND HAS RE-ENABLED A PAIR.
0645  REF  6 LAST 571   26,2640  7 0101 0            MASK   LMPJFAIL     DON'T USE ADS BECAUSE OF THE -0 CASE.
0650  REF  7 LAST 572   26,2641  54 101 0            TS     LMPJFAIL

0660  REF  5 LAST 571   26,2642  50 073 0            INDEX  RCSMONT4     TURN OFF THE JET-FAIL BITS IN CH5MASK &
0665  REF  3 LAST 571   26,2643  4 2673 0            CS     FAILTABL     CH6MASK.
0670  REF  6 LAST 571   26,2644  7 0102 0            MASK   CH5MASK
0675  REF  7 LAST 572   26,2645  54 102 0            TS     CH5MASK

0680  REF  6 LAST 572   26,2646  50 073 0            INDEX  RCSMONT4
0685  REF  4 LAST 572   26,2647  4 2674 1            CS     FAILTABL +1
0690  REF  6 LAST 571   26,2650  7 0103 1            MASK   CH6MASK
0695  REF  7 LAST 572   26,2651  54 103 1            TS     CH6MASK

0700  REF  3 LAST 571   26,2652  1 5733 1            TCF    RCSMONEX     DONE.


0775  REF 37 LAST 560                5733  RCSMONEX EQUALS RESJME       CHANGE THIS TO ATTACH SOMETHING ON.
```

L RCS FAILURE MONITOR USER'S OWN PAGE NO. 5 S3 E0

```
P0780          IN THE UPPER WORD OF EACH ENTRY OF THE KILLPAIR TABLE IS THE LMP COMMAND CODE TO ISOLATE A JET-PAIR.
R0790  BIT 15 = 1 TO ALLOW USE OF THE "STORCOM" LMP ROUTINE.  THE LOWER WORD OF EACH ENTRY CONTAINS THE RESET-COMMAND
R0800  CODE PLUS ONE, WHICH CORRESPONDS TO THE UPPER WORD.  (THE EXTRA +1 IS REMOVED BY THE CCS AT RCSMONIT.)

 0825                26,2653   40250 1  KILLPAIR 2OCT   40250 00252     2A. JETS 10 & 11.  CMDS 168 & 169.
C0825                26,2654   00252 1
 0830                26,2655   40170 0           2OCT   40170 00172     2B. JETS  9 & 12.  CMDS 120 & 121.
C0830                26,2656   00172 0
 0835                26,2657   40134 0           2OCT   40134 00136     1A. JETS 13 & 15.  CMDS  92 &  93.
C0835                26,2660   00136 0
 0840                26,2661   40154 0           2OCT   40154 00156     1B. JETS 14 & 16.  CMDS 108 & 109.
C0840                26,2662   00156 0
 0845                26,2663   40156 1           2OCT   40156 00160     3B. JETS  6 &  7.  CMDS 110 & 111.
C0845                26,2664   00160 0
 0850                26,2665   40310 1           2OCT   40310 00312     4B. JETS  1 &  3.  CMDS 200 & 201.
C0850                26,2666   00312 1
 0855                26,2667   40136 1           2OCT   40136 00140     3A. JETS  5 &  8.  CMDS  94 &  95.
C0855                26,2670   00140 1
 0860                26,2671   40350 0           2OCT   40350 00352     4A. JETS  2 &  4.  CMDS 232 & 233.
C0860                26,2672   00352 0

R0905          FAILTABL ENTRIES CONTAIN THE BIT FOR CH5MASK IN THE UPPER WORD, AND THE BIT FOR CH6MASK IN THE LOWER.

 0915                26,2673   00040 0  FAILTABL 2OCT   00040 00010
C0915                26,2674   00010 0
 0920                26,2675   00020 0           2OCT   00020 00020
C0920                26,2676   00020 0
 0925                26,2677   00100 0           2OCT   00100 00004
C0925                26,2700   00004 0
 0930                26,2701   00200 0           2OCT   00200 00200
C0930                26,2702   00200 0
 0935                26,2703   00010 0           2OCT   00010 00001
C0935                26,2704   00001 0
 0940                26,2705   00001 0           2OCT   00001 00002
C0940                26,2706   00002 0
 0945                26,2707   00004 0           2OCT   00004 00040
C0945                26,2710   00040 0
 0950                26,2711   00002 0           2OCT   00002 00100
C0950                26,2712   00100 0
```

L KALMAN FILTER FOR LM DAP USER'S OWN PAGE NO. 1 S3

R0001 THE FOLLOWING T5RUPT ENTRY BEGINS THE PROGRAM WHICH INITIALIZES THE KALMAN FILTER AND SETS UP A P-AXIS RUPT TO
R0003 OCCUR 20 MS FROM ITS BEGINNING.

```
0004  REF  14 LAST 547                    E6          EBANK= DT
0005                                   21,2000        BANK   21
0006  REF   1                21,2000  3 2402 0  FILTINIT CAF    MS30F       RESET TIMER IMMEDIATELY - DT = 30MS
0007  REF   9 LAST 521        21,2001  54 030 0            TS     TIME5

0008  REF  14 LAST 519        21,2002  22 016 0            LXCH   BANKRUPT    INTERRUPT LEAD IN (CONTINUED)
0009                           21,2003  0 0006 1            EXTEND
0010  REF  12 LAST 519        21,2004  22 012 1            QXCH   QRUPT

0011                           21,2005  0 0006 1            EXTEND             SET UP FOR P-AXIS RUPT
0012  REF   1                 21,2006  3 2100 1            QCA    PAX/FILT
0013  REF  12 LAST 551        21,2007  53,001 0            QXCH   T5ADR

0014  REF   1                 21,2010  3 2014 0            CAF    MOSTPASS    SET UP TO PERMIT DT CALCULATION DURING
0015  REF   1                 21,2011  55,544 1            TS     STEERADR    KALMAN FILTER INITIALIZATION PASS.

0016  REF   1                 21,2012  1 3675 1            TCF    CLEARCH5    TURN OFF Q,R-AXES RCS JETS.

0017  REF   1                 21,2013  02322 0  FIRSTADR   GENADR FILFIRST
```

R0018 THE FOLLOWING T5RUPT ENTRY BEGINS THE KALMAN FILTER PROGRAM. THIS SECTION ALSO SETS UP A T5RUPT TO OCCUR 20 MS
R0020 FROM ITS BEGINNING AND SETS IT TO GO TO THE LOCATION AT THE TOP OF THE POST FILTER RUPT LIST.

```
0022  REF   1                 21,2014  02060 0  MOSTPASS   GENADR DTCALC      WORD IN FILTPASS FOR THESE PASSES

0023  REF   2 LAST 574        21,2015  3 2402 0  FILTER    CAF    MS30F       RESET TIMER IMMEDIATELY - DT = 30MS
0024  REF  10 LAST 574        21,2016  54 030 0            TS     TIME5

0025  REF  15 LAST 574        21,2017  22 016 0            LXCH   BANKRUPT    INTERRUPT LEAD IN (CONTINUED)
0026                           21,2020  0 0006 1            EXTEND
0027  REF  13 LAST 574        21,2021  22 012 1            QXCH   QRUPT

0029                           21,2022  0 0006 1            EXTEND             SET RUPT ADDRESS TO TOP OF
0030  REF   1                 21,2023  3 1575 1            QCA    PFRPTLST    POST FILTER RUPT LIST
0031  REF  13 LAST 574        21,2024  53,001 0            QXCH   T5ADR

00311 REF  14 LAST 574        21,2025  4 1000 1            CS     T5ADR       IF THE TRIM GIMBAL CONTROL RUPT IS NEXT,
00312 REF   1                 21,2026  6 2406 1            AD     GT52CADR    REDUCE THE LENGTH OF THIS TIME5 RUPT.
00313                         21,2027  0 0006 1            EXTEND
00314                         21,2030  1 2032 0            BZF    +2
00315                         21,2031  1 2034 0            TCF    +3
00316 REF   1                 21,2032  3 2401 0            CAF    MS20F       RESET TIMER IMMEDIATELY - DT = 20MS
00317 REF  11 LAST 574        21,2033  54 030 0            TS     TIME5

0032  REF   2 LAST 574        21,2034  53,575 0            QXCH   PFRPTLST    ROTATE 2CADR'S IN POST FILTER RUPT LIST
0033  REF   3 LAST 574        21,2035  53,603 1            QXCH   PFRPTLST +6
0034  REF   4 LAST 574        21,2036  53,601 0            QXCH   PFRPTLST +4
```

```
L       KALMAN FILTER FOR LM DAP                                        USER'S OWN PAGE NO.  2          S3  E6

 0035   REF   5 LAST 574     21,2037  53'577 1          DXCH   PERPTLST +2
 0036   REF   1              21,2040  1 3703 1          TCF    COUNTDWN        DECREMENT PASSCTR

R0037   BEGIN THE KALMAN FILTER BY READING CDU ANGLES AND TIME.

 0038   REF   5 LAST 553     21,2041  0 6013 0  FILSTART TC     T6JOBCHK        CHECK T6 CLOCK FOR P-AXIS ACTIVITY

 0039                        21,2042  0 0006 1          EXTEND
 0040   REF  20 LAST 533     21,2043  3 0034 0          DCA    CDUY            STORE CDUY AND CDUZ AT PI AND IN 2.5 COM
 0041   REF   1              21,2044  53'541 1          DXCH   STORCDUY
 0042                        21,2045  0 0006 1          EXTEND                 BEGIN READING THE CLOCK TO GET TIME
 0043                        21,2046  00 004 0          READ   4                 INCREMENT.
 0044   REF 117 LAST 571     21,2047  54 001 1          TS     L
 0045                        21,2050  0 0006 1          EXTEND
 0046                        21,2051  06 004 0          RXOR   4               CHECK TO SEE IF CH 4 WAS IN TRANSITION
 0047                        21,2052  0 0006 1          EXTEND                   WHEN IT WAS FIRST READ.
 0048                        21,2053  1 2057 0          BZF    +4              BRANCH IF TIME WAS THE SAME IN 2 READS.
 0049                        21,2054  0 0006 1          EXTEND
 0050                        21,2055  00 004 0          READ   4
 0051   REF 118 LAST 575     21,2056  54 001 1          TS     L               THIS TIME READ ALWAYS GIVES GOOD NO.
 0052   REF   2 LAST 574     21,2057  0 1544 0          TC     STEERADR        SKIP DTCALC DURING INITIAL PASS

 0053   REF 119 LAST 575     21,2060  4 0001 1  DTCALC   CS     L
 0054   REF   1              21,2061  6 1543 1          AD     DAPTIME         A CONTAINS THE TIME DIFFERENCE (DT)
 0055   REF   2 LAST 575     21,2062  23'543 1          XCH    DAPTIME           SINCE THE LAST FILTER.
 0056                        21,2063  0 0006 1          EXTEND
 0057                        21,2064  6 2067 1          BZMF   +3
 0058   REF   4 LAST 454     21,2065  6 7744 1          AD     NEG1/2          THIS IS ADDING -1.0 TO -DT AND ACCOUNTS
 0059   REF   5 LAST 575     21,2066  6 7744 1          AD     NEG1/2          FOR AN OVERFLOW INTO CHANNEL 5

R0060   SCALING OF DELTA T FOR KALMAN FILTER IS 1/8 SECOND.

 0061                        21,2067  0 0006 1          EXTEND                 TIME NOW SCALED AT 5.12 SECONDS
 0062   REF  31 LAST 571     21,2070  7 7755 0          MP     BIT7            FIRST RESCALE TO 5.12/64
 0063   REF   1              21,2071  4 2376 0          CS     .64
 0064                        21,2072  0 0006 1          EXTEND                 THEN RESCALE TO 5.12/(64*.64) OR
 0065   REF 120 LAST 575     21,2073  7 0001 1          MP     L               5.12/40.96 WHICH IS THE SAME AS
 0066   REF   1              21,2074  1 3707 0          TCF    TIMEONE         DT SCALED AT 1/8.  JUMP VIA STEERAD2.
R0067   SET UP FILTER WEIGHTING VECTOR FOR THIS FILTER PASS.

 0068   REF   1              21,2075  11'547 1          CCS    WPOINTER        TEST FOR WEIGHTING VECTOR STEADY-STATE
 0069   REF   1              21,2076  1 2102 1          TCF    MOVEWGTS        POINTER NOT YET ZERO (MULTIPLE OF THREE)
 0070   REF  15 LAST 574                    E6          EBANK= DT
 0071                        21,2077   02255 1  PAX/FILT 2CADR  PAXIS          (ROOM FOR 2CADR IN CCS HOLES)
C0071   REF   2 LAST 491     21,2100   34066 0
 0072   REF   1              21,2101  1 2113 1          TCF    FLTZAXIS        STEADY-STATE ALREADY, NO UPDATING AGAIN

 0073   REF  27 LAST 543     21,2102  4 6311 0  MOVEWGTS CS     THREF           SET UP POINTER FOR THIS PASS
 0074   REF   2 LAST 575     21,2103  27'547 1          ADS    WPOINTER        (NEVER GETS BELOW ZERO HERE)
```

L KALMAN FILTER FOR LM DAP USER'S OWN PAGE NO. 3 S3 E6

```
0075                        21,2104  0 0006 1          EXTEND                WPOINTER IS INDEX = 87 FIRST TIME HERE
0076  REF   3 LAST 575     21,2105  5 1547 0          INDEX   WPOINTER      AND IS DECREASED BY 3 EVERY FILTER PASS
0077  REF   1              21,2106  3 2413 0          DCA     WVECTOR       UNTIL THE STEADY-STATE IS REACHED.
0078  REF   2 LAST  53     21,2107  53'551 0          DXCH    W0            MOVE IN NEW W0,W1
0079  REF   4 LAST 576     21,2110  51'547 0          INDEX   WPOINTER
0080  REF   2 LAST 576     21,2111  3 2414 1          CAF     WVECTOR +2
0081  REF   1              21,2112  55'552 0          TS      W2            MOVE IN NEW W2

0082  REF  76 LAST 562     21,2113  3 7762 0  FLTZAXIS CAF     TWO           SET UP INDEXER FOR D.P. PICKUP AND TO
0083  REF   8 LAST 534     21,2114  54 066 0          TS      QRCNTR        INDICATE Z-AXIS FILTER PASS

0084  REF   1              21,2115  1 2121 0          TCF     FLTYAXIS

0085  REF 193 LAST 570     21,2116  3 7767 0  GOYFILTR CAF     ZERO          SET INDEXER FOR Y-AXIS
0086  REF   9 LAST 576     21,2117  54 066 0          TS      QRCNTR

0087  REF   6 LAST 575     21,2120  0 6013 0          TC      T6JOBCHK      CHECK T6 CLOCK FOR P-AXIS ACTIVITY

0088  REF  10 LAST 576     21,2121  50 066 1  FLTYAXIS INDEX   QRCNTR
0089  REF   1              21,2122  53'554 0          DXCH    CDUYFIL       THETA IS D.P. SCALED AT 2 PI RADIANS
0090  REF   1              21,2123  52 073 1          DXCH    CDU
0091  REF  11 LAST 576     21,2124  50 066 1          INDEX   QRCNTR
0092  REF   1              21,2125  53'560 1          DXCH    DCDUYFIL      THETA IS D.P. SCALED AT PI/4 RAD/SEC
0093  REF   1              21,2126  52 062 1          DXCH    CDUDOT
0094  REF  12 LAST 576     21,2127  50 066 1          INDEX   QRCNTR
0095  REF   1              21,2130  53'564 0          DXCH    D2CDUYFL      THETA IS D.P. SCALED AT PI/8 RAD/SEC
0096  REF   1              21,2131  52 064 1          DXCH    CDU2DOT
0097  REF  13 LAST 576     21,2132  50 066 1          INDEX   QRCNTR
0098  REF   1              21,2133  31'567 1          CAE     Y3DOT         THETA IS S.P. SCALED AT PI/2 RAD/SEC
0099  REF   1              21,2134  57'570 1          XCH     CDU3DOT
```

R0100 NOTE THAT THE FILTERED VARIABLES ARE READ DESTRUCTIVELY FOR SPEED AND EFFICIENCY AND THAT Y3DOT IS NOT UPDATED,
R0102 SO IT MUST BE READ NON-DESTRUCTIVELY BUT NEED NOT BE RESTORED AFTER EACH KALMAN FILTER PASS.

L KALMAN FILTER FOR LM DAP USER'S OWN PAGE NO. 4 S3 E6

P0104 INTEGRATION EXTRAPOLATION EQUATIONS:

```
0105  REF   2 LAST 576   21,2135  30 063 1  KLMNFLTR CAE    CDJ2DOT     A SCALED AT PI/8 (USE S.P.)
0106                     21,2136  0 0006 1           EXTEND
0107  REF  16 LAST 575   21,2137  7 1542 1           MP     DT          ADT SCALED AT PI/64 OR .5ADT AT PI/128
0108                     21,2140  0 0006 1           EXTEND
0109  REF  38 LAST 487   21,2141  7 7752 1           MP     BIT10       RESCALE BY RIGHT SHIFT 5
0110  REF   2 LAST 576   21,2142  6 0061 0           AD     CDJDOT      W + .5ADT SCALED AT PI/4
0111                     21,2143  0 0006 1           EXTEND
0112  REF  17 LAST 577   21,2144  7 1542 1           MP     DT          (W + .5ADT)DT SCALED AT PI/32
0113                     21,2145  0 0006 1           EXTEND
0114  REF  13 LAST 553   21,2146  7 7753 0           MP     BIT9        RESCALE BY RIGHT SHIFT 6 (KEEP D.P.)
0115  REF   2 LAST 576   21,2147  20 073 1           DAS    CDJ         CDU = CDU + (W + .5ADT)DT SCALED AT 2PI

0116  REF   2 LAST 576   21,2150  31'570 1           CAE    CDJ3DOT     ADDT SCALED AT PI/2(7)
0117                     21,2151  0 0006 1           EXTEND
0118  REF  18 LAST 577   21,2152  7 1542 1           MP     DT          .5ADOTDT SCALED AT PI/2(11)
0119  REF   8 LAST 164   21,2153  54 065 0           TS     ITEMP5      (SAVE FOR ALPHA INTEGRATION)
0120                     21,2154  0 0006 1           EXTEND
0121  REF  32 LAST 575   21,2155  7 7755 0           MP     BIT7        RESCALE BY RIGHT SHIFT 8
0122  REF   3 LAST 577   21,2156  6 0063 1           AD     CDJ2DOT     A + .5ADOTDT SCALED AT PI/8
0123                     21,2157  0 0006 1           EXTEND
0124  REF  19 LAST 577   21,2160  7 1542 1           MP     DT          (A + .5ADOTDT)DT SCALED AT PI/64
0125                     21,2161  0 0006 1           EXTEND
0126  REF  31 LAST 553   21,2162  7 7751 1           MP     BIT11       RESCALE BY RIGHT SHIFT 4 (KEEP D.P.)
0127  REF   3 LAST 577   21,2163  20 062 1           DAS    CDJDOT      W = W + (A + .5ADOTDT)DT SCALED AT PI/4

0128  REF   9 LAST 577   21,2164  30 065 1           CAE    ITEMP5      ADOTDT SCALED AT PI/2(10) (FROM ABOVE)
0129                     21,2165  0 0006 1           EXTEND
0130  REF  20 LAST 571   21,2166  7 7754 1           MP     BIT8        RESCALE BY RIGHT SHIFT 7 (KEEP D.P.)
0131  REF   4 LAST 577   21,2167  20 064 1           DAS    CDJ2DOT     A = A + ADOTDT SCALED AT PI/8
```

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P0132 WEIGHTING VECTOR ADJUSTMENT EQUATIONS:

```
0133                          21,2170  0 0006 1    EXTEND
0134  REF   3 LAST 577       21,2171  3 0073 0    DCA     CDU              CONVERT CDU INTEGRATED VALUE FROM DOUBLE
0135  REF   1                 21,2172  0 2307 1    TC      ONETOTWO         PRECISION SCALED AT 2PI IN ONES COMPLE-
01355 REF  14 LAST 576        21,2173  10 066 0    CCS     QRCNTR           MENT TO SINGLE PRECISION SCALED AT PI
0136  REF 250 LAST 571        21,2174  50 000 1    INDEX   A                IN TWOS COMPLEMENT, THEN DIFFERENCE WITH
01365 REF   2 LAST 575        21,2175  31'540 1    CAE     STORCDUY
0137                          21,2176  0 0006 1    EXTEND                   STORED CDU REGISTER READING TO GET A
0138  REF  10 LAST 577        21,2177  20 065 0    MSU     ITEMP5           SINGLE PRECISION ONES COMPLEMENT RESULT
0139  REF   1                 21,2200  55'545 0    TS      DPDIFF           SCALED AT PI RADIANS (UPPER HALF)

0140  REF   4 LAST 578        21,2201  4 0073 1    CS      CDU +1           CREATE LOW ORDER WORD OF D.P. DIFFERENCE
0141                          21,2202  6 0000 1    DOUBLE                   ONES COMPLEMENT SCALED AT PI RADIANS AND
0142  REF   2 LAST 578        21,2203  57'546 1    XCH     DPDIFF +1        USE S.P. RESULT ABOVE AS HIGH ORDER WORD

0143                          21,2204  0 0006 1    EXTEND                   DPDIFF IS D.P. AT PI
0144  REF   3 LAST 578        21,2205  3 1546 1    DCA     DPDIFF
0146  REF  11 LAST 578        21,2206  22 065 1    LXCH    ITEMP5           SAVE LOW ORDER WORD FOR D.P. MULTIPLY
0147                          21,2207  0 0006 1    EXTEND
0148  REF   3 LAST 576        21,2210  7 1550 1    MP      W0               CDU = CDU + DPDIFF (D.P.) * W0 (S.P.)
0149  REF   5 LAST 578        21,2211  20 073 1    DAS     CDU
0150  REF  12 LAST 578        21,2212  30 065 1    CAE     ITEMP5           W0 IS SCALED AT 2
0151                          21,2213  0 0006 1    EXTEND                   DPDIFF IS RESCALED TO PI
0152  REF   4 LAST 578        21,2214  7 1550 1    MP      W0               W0*DPDIFF IS SCALED AT 2PI (AS CDU)
0153  REF   6 LAST 578        21,2215  26 073 1    ADS     CDU +1
0154  REF 121 LAST 575        21,2216  54 001 1    TS      L
0155                          21,2217  1 2221 0    TCF     +2
0156  REF   7 LAST 578        21,2220  26 072 0    ADS     CDU

0157  REF   4 LAST 578        21,2221  31'545 1    CAE     DPDIFF           RESCALE DPDIFF TO PI/128
0158                          21,2222  0 0006 1    EXTEND
0159  REF  21 LAST 577        21,2223  7 7754 1    MP      BIT8             DPDIFF (D.P.) * 128
0160  REF  13 LAST 578        21,2224  22 065 1    LXCH    ITEMP5
0161  REF   5 LAST 578        21,2225  31'546 1    CAE     DPDIFF +1
0162                          21,2226  0 0006 1    EXTEND
0163  REF  22 LAST 578        21,2227  7 7754 1    MP      BIT8
0164  REF  14 LAST 578        21,2230  6 0065 1    AD      ITEMP5
0165  REF  15 LAST 578        21,2231  22 065 1    LXCH    ITEMP5

0166                          21,2232  0 0006 1    EXTEND                   .  .
0167  REF   2 LAST  53        21,2233  7 1551 0    MP      W1               CDU = CDU + DPDIFF (D.P.) * W1 (S.P.)
0168  REF   4 LAST 577        21,2234  20 062 1    DAS     CDUDOT
0169  REF  16 LAST 578        21,2235  30 065 1    CAE     ITEMP5           W1 IS SCALED AT 32
0170                          21,2236  0 0006 1    EXTEND                   DPDIFF IS RESCALED TO PI/128
0171  REF   3 LAST 578        21,2237  7 1551 0    MP      W1               W1*DPDIFF IS SCALED AT PI/4 (AS CDUDOT)
0172  REF   5 LAST 578        21,2240  26 062 1    ADS     CDUDOT +1
0173  REF 122 LAST 578        21,2241  54 001 1    TS      L
0174                          21,2242  1 2244 0    TCF     +2
0175  REF   6 LAST 578        21,2243  26 061 1    ADS     CDUDOT
```

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```
0176  REF   6 LAST 578   21,2244  31'545 1          CAE   DPDIFF        RESCALE DPDIFF TO PI/64
0177                     21,2245  0 0006 1          EXTEND
0178  REF  33 LAST 577   21,2246  7 7755 0          MP    BIT7          DPDIFF (D.P.) * 64
0179  REF  17 LAST 578   21,2247  22 065 1          LXCH  ITEMP5
0180  REF   7 LAST 579   21,2250  31'546 1          CAE   DPDIFF +1
0181                     21,2251  0 0006 1          EXTEND
0182  REF  34 LAST 579   21,2252  7 7755 0          MP    BIT7
0183  REF  18 LAST 579   21,2253  6 0065 1          AD    ITEMP5
0184  REF  19 LAST 579   21,2254  22 065 1          LXCH  ITEMP5

0185                     21,2255  0 0006 1          EXTEND                 ..      ..
0186  REF   2 LAST 576   21,2256  7 1552 0          MP    W2              CDU = CDU + DPDIFF (D.P.) * W2 (S.P.)
0187  REF   5 LAST 577   21,2257  20 064 1          DAS   CDU2DOT
0188  REF  20 LAST 579   21,2260  30 065 1          CAE   ITEMP5          W2 IS SCALED AT 8
0189                     21,2261  0 0006 1          EXTEND
0190  REF   3 LAST 579   21,2262  7 1552 0          MP    W2              W2*DPDIFF IS SCALED AT PI/8 (AS CDU2DOT)
0191  REF   6 LAST 579   21,2263  26 064 1          ADS   CDU2DOT +1
0192  REF 123 LAST 578   21,2264  54 001 1          TS    L
0193                     21,2265  1 2267 1          TCF   +2
0194  REF   7 LAST 579   21,2266  26 063 0          ADS   CDU2DOT

R0195 RESTORE VARIABLES AND TEST FOR COMPLETION OR ADDITIONAL AXIS.

0196  REF   8 LAST 578   21,2267  52 073 1  FILTAXIS DXCH  CDU
0197  REF  15 LAST 578   21,2270  50 066 1          INDEX  QRCNTR         THETA IS D.P. SCALED AT 2 PI RADIANS
0198  REF   2 LAST 576   21,2271  53'554 0          DXCH  CDUYFIL
0199  REF   7 LAST 578   21,2272  52 062 1          DXCH  CDUDOT           .
0200  REF  16 LAST 579   21,2273  50 066 1          INDEX  QRCNTR         THETA IS D.P. SCALED AT PI/4 RAD/SEC
0201  REF   2 LAST 576   21,2274  53'560 1          DXCH  DCDUYFIL
0202  REF   8 LAST 579   21,2275  52 064 1          DXCH  CDU2DOT          ..                              2
0203  REF  17 LAST 579   21,2276  50 066 1          INDEX  QRCNTR         THETA IS D.P. SCALED AT PI/8 RAD/SEC
0204  REF   2 LAST 576   21,2277  53'564 0          DXCH  D2CDUYFL

0208  REF  18 LAST 579   21,2300  10 066 0          CCS   QRCNTR
0209  REF   1            21,2301  1 2116 1          TCF   GOYFILTR        IF 2, Y-AXIS STILL TO GO

0210  REF  15 LAST 574   21,2302  4 1000 1          CS    T5ADR           IF THE TRIM GIMBAL CONTROL RUPT IS NEXT,
0211  REF   2 LAST 574   21,2303  6 2406 1          AD    GTS2CADR        DO THE Q,R-AXIS STATE TRANSFORMATIONS
0212                     21,2304  0 0006 1          EXTEND                AND THE 20 MS STATE EXTRAPOLATION
0213  REF   1            21,2305  1 2603 1          BZF   GIMBAL
0214  REF  38 LAST 572   21,2306  1 5733 1          TCF   RESUME          OTHERWISE, RESUME

R0215 SUBROUTINE FOR FILTER WHICH TAKES 1 COMPLEMENT NUMBER INTO A 2 COMP.

0216                     21,2307  20 001 1  ONETOTWO DDOUBL               SEE RTB OP CODES IN BANK 15 FOR NOTES ON
0217  REF 251 LAST 578   21,2310  10 000 0          CCS   A                 THIS COMPUTATION.
0218  REF 137 LAST 561   21,2311  6 7763 1          AD    ONE
0219                     21,2312  1 2314 1          TCF   +2
0220                     21,2313  4 0000 0          COM
0221  REF  21 LAST 579   21,2314  54 065 0          TS    ITEMP5
```

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```
0222                          21,2315  1 2321 1          TCF     +4
0223   REF 252 LAST 579       21,2316  50 000 1          INDEX   A
0224   REF   3 LAST 363       21,2317  3 7744 1          CAF     LIMITS
0225   REF  22 LAST 579       21,2320  26 065 0          ADS     ITEMP5
0226   REF 199 LAST 553       21,2321  0 0002 0          TC      Q               RETURN

R0227  THIS PROGRAM INITIALIZES THE KALMAN FILTER PROGRAM.

0228   REF   3 LAST 575       21,2322  23'543 1  FILFIRST LXCH    DAPTIME         INITIALIZE TIME.
0229   REF   1                21,2323  3 2400 1          CAF     POINT=90        INITIALIZE THE WEIGHTING VECTOR POINTER
0230   REF   5 LAST 576       21,2324  55'547 1          TS      WPOINTER
0231   REF   2 LAST 574       21,2325  3 2014 0          CAF     MOSTPASS        SET UP FOR NEXT PASSES
0232   REF   3 LAST 575       21,2326  55'544 1          TS      STEERADR
0233                          21,2327  0 0006 1          EXTEND                  SET UP POST FILTER RUPT LIST
0234   REF   1                21,2330  3 2404 0          DCA     DGTSEADR
0235   REF   6 LAST 575       21,2331  53'575 0          DXCH    PERPTLST
0236                          21,2332  0 0006 1          EXTEND
0237   REF   2 LAST 574       21,2333  3 2100 1          DCA     PAX/FILT
0238   REF   7 LAST 580       21,2334  53'577 1          DXCH    PERPTLST +2
0239                          21,2335  0 0006 1          EXTEND
0240   REF   3 LAST 580       21,2336  3 2100 1          DCA     PAX/FILT
0241   REF   8 LAST 580       21,2337  53'603 1          DXCH    PERPTLST +6
0242                          21,2340  0 0006 1          EXTEND
0243   REF   3 LAST 579       21,2341  3 2407 0          DCA     GTS2CADR
0244   REF   9 LAST 580       21,2342  53'601 0          DXCH    PERPTLST +4
0245                          21,2343  0 0006 1          EXTEND                  CHANGE POST P FILTER TO FILTER
0246   REF   1                21,2344  3 2411 1          DCA     POSTPFIL
0247   REF   3 LAST 492       21,2345  53'573 0          DXCH    PFILTADR

0248   REF   3 LAST 578       21,2346  31'540 1          CAE     STORCDUY
0249                          21,2347  0 0006 1          EXTEND
0250   REF  38 LAST 548       21,2350  7 7746 1          MP      BIT14
0251   REF   3 LAST 579       21,2351  53'554 0          DXCH    CDUYFIL         INITIALIZE THE STATE VECTOR TO CDU VALUE
0252   REF   1                21,2352  31'541 0          CAE     STORCDUZ
0253                          21,2353  0 0006 1          EXTEND
0254   REF  39 LAST 580       21,2354  7 7746 1          MP      BIT14
0255   REF   1                21,2355  53'556 1          DXCH    CDUZFIL
0256   REF 194 LAST 576       21,2356  3 7767 0          CA      ZERO
0257                          21,2357  1 2363 1          TCF     +4              RATES INITIALIZED BY RATEINIT.
0258   REF   3 LAST 579       21,2360  55'560 1          TS      DCDUYFIL +1
0259   REF   1                21,2361  55'561 0          TS      DCDUZFIL
0260   REF   2 LAST 580       21,2362  55'562 0          TS      DCDUZFIL +1
0261   REF   3 LAST 579       21,2363  55'563 1          TS      D2CDUYFL
0262   REF   4 LAST 580       21,2364  55'564 0          TS      D2CDUYFL +1
0263   REF   1                21,2365  55'565 1          TS      D2CDUZFL
0264   REF   2 LAST 580       21,2366  55'566 1          TS      D2CDUZFL +1
0265   REF   2 LAST 576       21,2367  55'567 0          TS      Y3DOT
0266   REF   1                21,2370  55'571 1          TS      Z3DOT
0267   REF   4 LAST 495       21,2371  55'523 0          TS      VEGJQ
0268   REF   4 LAST 522       21,2372  55'525 0          TS      VEGJR
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L KALMAN FILTER FOR LM DAP USER'S OWN PAGE NO. 8 S3 E6

```
02683  REF   2 LAST  56      21,2373  55'733 0          TS      QACCDOTMP      INITIALIZE TEMPORARY STORAGE FOR QACCDOT
02686  REF   1               21,2374  55'735 0          TS      RACCDOTMP      AND RACCDOT VALUES COMING FROM STS.
0269   REF   39 LAST 579     21,2375  1 5733 1          TCF     RESJME

0270                         21,2376  24366 1  .64      DEC     0.64000
0271                         21,2377  14000 1  BIT12-13 OCTAL   14000
0272                         21,2400  00132 1  POINT=90 DEC     90             POINTER INITIALIZED ONE GROUP PAST END
0273                         21,2401  37776 0  M520F    OCTAL   37776
0274                         21,2402  37775 0  M530F    OCTAL   37775
0275   REF   20 LAST 577                  E6            EBANK=  DT
0276                         21,2403  02544 0  DSTSFADR 2CADR   DSTS
C0276  REF   1               21,2404  42066 1
0277   REF   3 LAST 575      21,2405  02255 1  PAXISADR GENADR  PAXIS
0278   REF   21 LAST 581                  E6            EBANK=  DT
0279                         21,2406  02572 0  STS2CADR 2CADR   STS
C0279  REF   1               21,2407  42066 1
0280   REF   22 LAST 581                  E6            EBANK=  DT
0281                         21,2410  02015 1  POSTPFIL 2CADR   FILTER
C0281  REF   1               21,2411  42066 1
```

L KALMAN FILTER FOR LM DAP USER'S OWN PAGE NO. 9 S3 E6

P0282 THE KALMAN FILTER WEIGHTING VECTORS ARE LISTED IN THE FOLLOWING TABLE ALONG WITH THE TIME FROM THE LAST FILTER
R0284 INITIALIZATION FOR WHICH THEY ARE TO BE USED. (THE VECTORS ARE STORED IN ORDERED TRIPLES (W0,W1,W2) IN
R0286 DESCENDING ORDER IN TIME WITH THE STEADY STATE VALUES AT THE TOP.)

R02864 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

R02865 WEIGHTING VECTOR SET : 07/28/67 9:07

R0287 THE COMPONENTS ARE SCALED AS FOLLOWS:
R0288 W0 : SCALED AT 2
R0289 W1 : SCALED AT 32
R0290 W2 : SCALED AT 8

0291		21,2412	02352 1	WVECTOR	DEC	0.07679	W0 AT RELATIVE TIME : 1.50 SECS, OR MORE
0292		21,2413	00203 0		DEC	0.00799	W1 AT RELATIVE TIME : 1.50 SECS, OR MORE
0293		21,2414	00665 1		DEC	0.02665	W2 AT RELATIVE TIME : 1.50 SECS, OR MORE
0294		21,2415	04136 1		DEC	0.13072	W0 AT RELATIVE TIME : 1.45 SECONDS
0295		21,2416	00553 1		DEC	0.02213	W1 AT RELATIVE TIME : 1.45 SECONDS
0296		21,2417	03164 1		DEC	0.10086	W2 AT RELATIVE TIME : 1.45 SECONDS
0297		21,2420	04231 0		DEC	0.13435	W0 AT RELATIVE TIME : 1.40 SECONDS
0298		21,2421	00601 0		DEC	0.02350	W1 AT RELATIVE TIME : 1.40 SECONDS
0299		21,2422	03423 1		DEC	0.11054	W2 AT RELATIVE TIME : 1.40 SECONDS
0300		21,2423	04330 0		DEC	0.13816	W0 AT RELATIVE TIME : 1.35 SECONDS
0301		21,2424	00631 0		DEC	0.02499	W1 AT RELATIVE TIME : 1.35 SECONDS
0302		21,2425	03707 1		DEC	0.12154	W2 AT RELATIVE TIME : 1.35 SECONDS
0303		21,2426	04431 0		DEC	0.14215	W0 AT RELATIVE TIME : 1.30 SECONDS
0304		21,2427	00664 0		DEC	0.02662	W1 AT RELATIVE TIME : 1.30 SECONDS
0305		21,2430	04224 1		DEC	0.13403	W2 AT RELATIVE TIME : 1.30 SECONDS
0306		21,2431	04535 0		DEC	0.14632	W0 AT RELATIVE TIME : 1.25 SECONDS
0307		21,2432	00721 0		DEC	0.02841	W1 AT RELATIVE TIME : 1.25 SECONDS
0308		21,2433	04575 1		DEC	0.14826	W2 AT RELATIVE TIME : 1.25 SECONDS
0309		21,2434	04644 0		DEC	0.15066	W0 AT RELATIVE TIME : 1.20 SECONDS
0310		21,2435	00761 1		DEC	0.03035	W1 AT RELATIVE TIME : 1.20 SECONDS
0311		21,2436	05207 1		DEC	0.16446	W2 AT RELATIVE TIME : 1.20 SECONDS
0312		21,2437	04756 1		DEC	0.15516	W0 AT RELATIVE TIME : 1.15 SECONDS
0313		21,2440	01024 0		DEC	0.03247	W1 AT RELATIVE TIME : 1.15 SECONDS
0314		21,2441	05665 1		DEC	0.18293	W2 AT RELATIVE TIME : 1.15 SECONDS
0315		21,2442	05072 1		DEC	0.15980	W0 AT RELATIVE TIME : 1.10 SECONDS
0316		21,2443	01072 0		DEC	0.03477	W1 AT RELATIVE TIME : 1.10 SECONDS
0317		21,2444	06416 1		DEC	0.20395	W2 AT RELATIVE TIME : 1.10 SECONDS
0318		21,2445	05207 1		DEC	0.16452	W0 AT RELATIVE TIME : 1.05 SECONDS
0319		21,2446	01142 1		DEC	0.03726	W1 AT RELATIVE TIME : 1.05 SECONDS
0320		21,2447	07224 1		DEC	0.22781	W2 AT RELATIVE TIME : 1.05 SECONDS
0321		21,2450	05325 0		DEC	0.16926	W0 AT RELATIVE TIME : 1.00 SECONDS
0322		21,2451	01216 0		DEC	0.03991	W1 AT RELATIVE TIME : 1.00 SECONDS
0323		21,2452	10116 0		DEC	0.25475	W2 AT RELATIVE TIME : 1.00 SECONDS
0324		21,2453	05442 0		DEC	0.17393	W0 AT RELATIVE TIME : 0.95 SECONDS
0325		21,2454	01274 1		DEC	0.04272	W1 AT RELATIVE TIME : 0.95 SECONDS
0326		21,2455	11073 0		DEC	0.28488	W2 AT RELATIVE TIME : 0.95 SECONDS
0327		21,2456	05553 1		DEC	0.17839	W0 AT RELATIVE TIME : 0.90 SECONDS

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0328		21,2457	01353 0	DEC	0.04562	W1 AT RELATIVE TIME : 0.90 SECONDS
0329		21,2460	12134 1	DEC	0.31809	W2 AT RELATIVE TIME : 0.90 SECONDS
0330		21,2461	05656 1	DEC	0.18247	W0 AT RELATIVE TIME : 0.85 SECONDS
0331		21,2462	01433 1	DEC	0.04853	W1 AT RELATIVE TIME : 0.85 SECONDS
0332		21,2463	13245 0	DEC	0.35383	W2 AT RELATIVE TIME : 0.85 SECONDS
0333		21,2464	05747 0	DEC	0.18597	W0 AT RELATIVE TIME : 0.80 SECONDS
0334		21,2465	01511 0	DEC	0.05132	W1 AT RELATIVE TIME : 0.80 SECONDS
0335		21,2466	14404 1	DEC	0.39087	W2 AT RELATIVE TIME : 0.80 SECONDS
0336		21,2467	06023 0	DEC	0.18867	W0 AT RELATIVE TIME : 0.75 SECONDS
0337		21,2470	01561 1	DEC	0.05380	W1 AT RELATIVE TIME : 0.75 SECONDS
0338		21,2471	15524 0	DEC	0.42701	W2 AT RELATIVE TIME : 0.75 SECONDS
0339		21,2472	06060 1	DEC	0.19040	W0 AT RELATIVE TIME : 0.70 SECONDS
0340		21,2473	01622 0	DEC	0.05676	W1 AT RELATIVE TIME : 0.70 SECONDS
0341		21,2474	16535 0	DEC	0.45880	W2 AT RELATIVE TIME : 0.70 SECONDS
0342		21,2475	06074 1	DEC	0.19117	W0 AT RELATIVE TIME : 0.65 SECONDS
0343		21,2476	01646 1	DEC	0.05698	W1 AT RELATIVE TIME : 0.65 SECONDS
0344		21,2477	17323 0	DEC	0.48160	W2 AT RELATIVE TIME : 0.65 SECONDS
0345		21,2500	06076 0	DEC	0.19127	W0 AT RELATIVE TIME : 0.60 SECONDS
0346		21,2501	01654 1	DEC	0.05736	W1 AT RELATIVE TIME : 0.60 SECONDS
0347		21,2502	17536 1	DEC	0.49013	W2 AT RELATIVE TIME : 0.60 SECONDS
0348		21,2503	06100 0	DEC	0.19142	W0 AT RELATIVE TIME : 0.55 SECONDS
0349		21,2504	01646 1	DEC	0.05702	W1 AT RELATIVE TIME : 0.55 SECONDS
0350		21,2505	17266 0	DEC	0.47984	W2 AT RELATIVE TIME : 0.55 SECONDS
0351		21,2506	06126 1	DEC	0.19273	W0 AT RELATIVE TIME : 0.50 SECONDS
0352		21,2507	01635 0	DEC	0.05644	W1 AT RELATIVE TIME : 0.50 SECONDS
0353		21,2510	16267 0	DEC	0.44869	W2 AT RELATIVE TIME : 0.50 SECONDS
0354		21,2511	06225 1	DEC	0.19660	W0 AT RELATIVE TIME : 0.45 SECONDS
0355		21,2512	01636 0	DEC	0.05649	W1 AT RELATIVE TIME : 0.45 SECONDS
0356		21,2513	14600 1	DEC	0.39845	W2 AT RELATIVE TIME : 0.45 SECONDS
0357		21,2514	06425 1	DEC	0.20443	W0 AT RELATIVE TIME : 0.40 SECONDS
0358		21,2515	01674 0	DEC	0.05837	W1 AT RELATIVE TIME : 0.40 SECONDS
0359		21,2516	12552 0	DEC	0.33458	W2 AT RELATIVE TIME : 0.40 SECONDS
0360		21,2517	06753 0	DEC	0.21746	W0 AT RELATIVE TIME : 0.35 SECONDS
0361		21,2520	02022 0	DEC	0.06360	W1 AT RELATIVE TIME : 0.35 SECONDS
0362		21,2521	10356 0	DEC	0.26452	W2 AT RELATIVE TIME : 0.35 SECONDS
0363		21,2522	07447 1	DEC	0.23678	W0 AT RELATIVE TIME : 0.30 SECONDS
0364		21,2523	02300 0	DEC	0.07419	W1 AT RELATIVE TIME : 0.30 SECONDS
0365		21,2524	06204 1	DEC	0.19655	W2 AT RELATIVE TIME : 0.30 SECONDS
0366		21,2525	10340 1	DEC	0.26366	W0 AT RELATIVE TIME : 0.25 SECONDS
0367		21,2526	02767 0	DEC	0.09322	W1 AT RELATIVE TIME : 0.25 SECONDS
0368		21,2527	04210 0	DEC	0.13332	W2 AT RELATIVE TIME : 0.25 SECONDS
0369		21,2530	11461 1	DEC	0.29988	W0 AT RELATIVE TIME : 0.20 SECONDS
0370		21,2531	04030 0	DEC	0.12645	W1 AT RELATIVE TIME : 0.20 SECONDS
0371		21,2532	02466 1	DEC	0.08144	W2 AT RELATIVE TIME : 0.20 SECONDS
0372		21,2533	13107 0	DEC	0.34809	W0 AT RELATIVE TIME : 0.15 SECONDS
0373		21,2534	05760 0	DEC	0.18652	W1 AT RELATIVE TIME : 0.15 SECONDS
0374		21,2535	01255 1	DEC	0.04182	W2 AT RELATIVE TIME : 0.15 SECONDS
0375		21,2536	15114 1	DEC	0.41088	W0 AT RELATIVE TIME : 0.10 SECONDS
0376		21,2537	11614 1	DEC	0.30542	W1 AT RELATIVE TIME : 0.10 SECONDS
0377		21,2540	00372 1	DEC	0.01526	W2 AT RELATIVE TIME : 0.10 SECONDS

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 0378                    21,2541   17234 1          DEC    0.47825        W0 AT RELATIVE TIME : 0.05 SECONDS
 0379                    21,2542   22205 0          DEC    0.57064        W1 AT RELATIVE TIME : 0.05 SECONDS
 0380                    21,2543   00035 1          DEC    0.00174        W2 AT RELATIVE TIME : 0.05 SECONDS
R03805  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967**********
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P0381   DUMMY TRIM GIMBAL RUPT:

 0382   REF   2 LAST 574      21,2544  3 2401 0  DGTS     CAF     MS20F          RESET TIMER IMMEDIATELY -  DT = 20MS
 0383   REF  12 LAST 574      21,2545  54 030 0           TS      TIME5
03833   REF  16 LAST 574      21,2546  22 016 0           XCH     BANKRUPT       INTERRUPT LEAD IN (CONTINUED)
03836                         21,2547  0 0006 1           EXTEND
03839   REF  14 LAST 574      21,2550  22 012 1           QXCH    QRUPT

 0384                         21,2551  0 0006 1           EXTEND                 SET UP FILTER RUPT
 0385   REF   2 LAST 580      21,2552  3 2411 1           DCA     POSTDFIL
 0386   REF  16 LAST 579      21,2553  53,001 0           DXCH    T5ADR

 0391   REF   2 LAST 581      21,2554  4 1735 0           CS      RACCDOTMP      STORE NEW VALUES OF QACCDOT, RACCDOT NOW
03911   REF   2 LAST 495      21,2555  55,535 1           TS      RACCDOT        THAT 100 MS HAVE PASSED.  (REMEMBER THAT
03912   REF   3 LAST 581      21,2556  4 1733 0           CS      QACCDOTMP      THESE ARE STORED COMPLEMENTED.)
03913   REF   3 LAST 517      21,2557  55,533 1           TS      QACCDOT
03914   REF  40 LAST 581      21,2560  1 5733 1           TCF     RESUME

 0392   REF  23 LAST 581                   E6            EBANK=  DI
 0393                        20,3030                     BANK    20

R0394   DUMMY FILTER RUPT AFTER Q,R-AXES RUPT:

 0395                        20,3030   37775 0  MS30120  OCTAL   37775
 0396   REF   7 LAST 529                   E6            EBANK=  TQR
 0397                        20,3031   02255 1  PAXBNK20 2CADR   PAXIS
C0397   REF   4 LAST 581     20,3032   34066 0
 0398   REF   1              20,3033   3 3030 1 FILDUMMY CAF     MS30120        RESET TIMER IMMEDIATELY - DT= 30 MS
 0399   REF  13 LAST 585     20,3034   54 030 0           TS      TIME5

 0400   REF  17 LAST 585     20,3035   22 016 0           XCH     BANKRUPT       INTERRUPT LEAD IN (CONTINUED)
 04003                       20,3036   0 0006 1           EXTEND                 SAVE THE LAST Q ON ALL T5RUPT LEAD IN'S
 04005  REF  15 LAST 585     20,3037   22 012 1           QXCH    QRUPT

 0401                        20,3040   0 0006 1           EXTEND                 SET UP PAXIS RUPT
 0402   REF   1              20,3041   3 3032 0           DCA     PAXBNK20
 0403   REF  17 LAST 585     20,3042   53,001 0           DXCH    T5ADR

040301  REF   1              20,3043   0 3105 0           TC      TORQUEVK
040302  REF  41 LAST 585     20,3044   1 5733 1           TCF     RESUME

R040305 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

R040309 CODING FOR RATE HOLD MODE WRITTEN OVER.

R040312 FROM ENGINOF1.  MAKE SURE FLAGS FOR EXTRADRDINARY GTS ARE DOWN.

040315  REF   5 LAST 479     20,3045   3 5632 0 RESETCTR CA      EBANK6         SAVE CALLERS EBANK.
040318  REF  35 LAST 523     20,3046   56 003 1           XCH     EBANK
040321  REF   8 LAST 478     20,3047   54 066 0           TS      ITEMP6         SAVE L IN CASE THIS WAS 1STENGOF.
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040324 REF  11 LAST 557    20,3050  3 7745 0          CAF     NEGMAX
040327 REF   5 LAST 522    20,3051  55'744 0          TS      TRIMCNTR
04033  REF 195 LAST 580    20,3052  3 7767 0          CAF     ZERO
040333 REF   3 LAST 522    20,3053  55'745 1          TS      GTSMNITR

040336 REF   9 LAST 585    20,3054  3 0066 1          CA      ITEMP6          RESTORE CALLERS EBANK.
040338 REF  36 LAST 585    20,3055  54 003 0          TS      EBANK

04035  REF 200 LAST 580    20,3056  0 0002 0          TC      Q               RETURN TO CALLER OF ENGINOFF OR ENGINOF1

R040352 FROM APSENGON - STORE IGNITION TIME FOR THE ENGINOFF DELAY LOGIC.

040354 REF   6 LAST 481    20,3057  55'310 0  2DINSRTA TS      DVSELECT        STORE PGNSCADR IN DVSELECT

040356                     20,3060  0 0006 1          EXTEND
040358 REF  20 LAST 523    20,3061  3 0025 0          DCA     TIME2           STORE CURRENT TIME IN /TEMP3/
04036  REF   2 LAST 523    20,3062  53'760 0          DXCH    /TEMP3/
040362 REF   1             20,3063  1 2204 1          TCF     2DINSRT +1

R040364 FROM ENGINOFF - PREPARE FOR TRANSFER TO THE ENGINOFF DELAY LOGIC.

040366                     20,3064  0 0006 1  2DINSRTB EXTEND                  SAVE Q FOR AN INDEFINITE TIME - IT
040368 REF   3 LAST 522    20,3065  22 376 0          DXCH    /TEMP1/         POINTS TO SWRETURN OR ISWRETRN.
04037  REF   6 LAST 585    20,3066  3 5632 0          CAF     EBANK6
040372 REF  37 LAST 586    20,3067  56 003 1          XCH     EBANK           GO TO EBANK 6 AND STORE CALLERS EBANK.
040374 REF   2 LAST 523    20,3070  55'756 0          TS      /TEMP2/

040376 REF   4 LAST 523    20,3071  3 1763 1          CA      TMINAPS         IF TMINAPS IS NEGATIVE OR ZERO DO NOT
040378                     20,3072  0 0006 1          EXTEND                  DELAY THE ENGINOFF CALL.
04038  REF   1             20,3073  6 3076 0          BZMF    2DINSRTC

040381 REF  34 LAST 523    20,3074  0 5225 1          TC      POSTJUMP        *TMINAPS OK. JUMP TO THE DELAY LOGIC*
040382 REF   1             20,3075  36173 1           CADR    17INSRT

040383 REF   3 LAST 586    20,3076  3 1756 1  2DINSRTC CA      /TEMP2/         RESTORE EBANK AND RETURN TO ENGINOFF.
040384 REF  38 LAST 586    20,3077  54 003 0          TS      EBANK
040385 REF   3 LAST 523    20,3100  1 2264 1          TCF     ENGINOFF +1

R040386 FOLLOWING CODING LEFT IN PLACE TO PRESERVE RELATIVE ADDRESSES.

040392 REF   6 LAST 492    20,3101  54 771 1          TS      DELCDUX         IF 0, DONE DELCDUY AND ZERO DELCDJX.


0404   REF   2 LAST 585    20,3102  0 3105 0    +5    TC      TORQUEVK
040401 REF  42 LAST 585    20,3103  1 5733 1          TCF     RESJME
040402 REF  32 LAST 534    20,3104  0 4736 1          TC      CCSHOLE

R04041  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967**********
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P04049 THIS SUBROUTINE COMPUTES JET TORQUE CONTRIBUTION TO RATE

```
040499 REF   8 LAST 585   20,3105  4 1612 1  TORQUEVK  CS    TQR       TQR IS SCALED THE SAME AS TIME 6
0405   REF   1            20,3106  6 3213 1            AD    CSPINKF
0406                      20,3107  0 0006 1            EXTEND
0407   REF   1            20,3110  6 3126 1            BZMF  FULLCSP
0408   REF   9 LAST 587   20,3111  3 1612 0            CA    TQR
0409                      20,3112  0 0006 1            EXTEND
0410   REF  25 LAST 493   20,3113  7 7757 1            MP    BIT5
0411   REF 124 LAST 579   20,3114  30 001 0            CAE   L
0412                      20,3115  0 0006 1            EXTEND
0413   REF   1            20,3116  7 3210 0            MP    16/25KF
0414   REF  10 LAST 587   20,3117  55'612 1            TS    TQR
04141                     20,3120  0 0006 1            EXTEND
04142  REF  10 LAST 586   20,3121  22 066 1            DXCH  ITEMP6
0415   REF   1            20,3122  0 3140 1            TC    JETTSUB
0416   REF 136 LAST 586   20,3123  3 7767 0            CAF   ZERO
0417   REF  11 LAST 587   20,3124  55'612 1            TS    TQR
0418   REF  11 LAST 587   20,3125  0 0066 1            TC    ITEMP6      RETURN TO TORQUEVK CALLER
0419                      20,3126  4 0000 0  FULLCSP   COM               WE COME HERE WHEN TQR GREATER THAN .1SEC
0420   REF  34 LAST 533   20,3127  54 062 1            TS    ITEMP2
0421   REF   1            20,3130  3 3211 0            CA    CSPAT1      CSP (.1 SEC) SCALED AT 1.
04211  REF  12 LAST 587   20,3131  55'612 1            TS    TQR         TEMPORARY, LATER TQR:.1=TQR
04212                     20,3132  0 0006 1            EXTEND
04213  REF  12 LAST 587   20,3133  22 066 1            DXCH  ITEMP6
0422   REF   2 LAST 587   20,3134  0 3140 1            TC    JETTSUB
0423   REF  35 LAST 587   20,3135  30 062 0            CAE   ITEMP2
0424   REF  13 LAST 587   20,3136  55'612 1            TS    TQR
0425   REF  13 LAST 587   20,3137  0 0066 1            TC    ITEMP6      RETURN TO TORQUEVK CALLER.
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R04251 A SUBROUTINE WHICH,GIVEN TQR SCALED AT 1, FINDS JETRATE AND SUMRATE.

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0426                      20,3140  0 0006 1  JETTSUB   EXTEND
0427   REF   5 LAST 561   20,3141  7 1607 0            MP    NO.QJETS
0428   REF 125 LAST 587   20,3142  30 001 0            CAE   L
0429                      20,3143  0 0006 1            EXTEND
0430   REF   1            20,3144  7 1614 1            MP    1JACCQ
0431   REF   3 LAST 520   20,3145  55'605 1            TS    JETRATEQ    TEMP STORE OF ACC*NJETS*TQR FOR Q AXIS.
0432   REF   3 LAST 517   20,3146  27'624 1            ADS   SUMRATEQ    SUMRATE =SUMRATE+ACC*NJETS*TQR, WHICH IS
0433   REF  14 LAST 587   20,3147  31'612 0            CAE   TQR           THE ACCUMULATED JET FIRING ACC. OVER
0434                      20,3150  0 0006 1            EXTEND              A TWO SECOND INTERVAL.
0435   REF   4 LAST 562   20,3151  7 1610 0            MP    NO.RJETS    SAME AS ABOVE FOR R AXIS THIS TIME.
0436   REF 126 LAST 587   20,3152  30 001 0            CAE   L
0437                      20,3153  0 0006 1            EXTEND
0438   REF   1            20,3154  7 1615 0            MP    1JACCR
0439   REF   3 LAST 520   20,3155  55'606 1            TS    JETRATER
0440   REF   2 LAST 517   20,3156  27'625 0            ADS   SUMRATER
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044002 REF   7 LAST 517   20,3157  11'732 1          CCS   AOSCOUNT   TEST TO SEE IF AOSTASK IS COMING UP:
044004 REF   1            20,3160  1 3167 0          TCF   WATERATE   NO, SKIP.

044006 REF   4 LAST 587   20,3161  4 1605 1          CS    JETRATEQ   REMOVE THE MOST RECENT JETRATES FROM THE
044008 REF   3 LAST 517   20,3162  55'622 1          TS    SAVRATEQ   SUMRATES AND SET UP INITIALIZATION OF
04401  REF   4 LAST 587   20,3163  27'624 1          ADS   SUMRATEQ   THE SUMRATES FOR THE NEXT 2 SECOND
044012 REF   4 LAST 587   20,3164  4 1606 1          CS    JETRATER   INTERVAL.  (SAVED AS NEGATIVES.)
044014 REF   2 LAST 517   20,3165  55'623 0          TS    SAVRATER
044016 REF   3 LAST 587   20,3166  27'625 0          ADS   SUMRATER

0441   REF   5 LAST 520   20,3167  31'641 0 WATERATE CAE   WFORQR     WFORQR IS SCALED AT 16 BUT THE ALGORITHM
0442                      20,3170  0 0006 1          EXTEND             USES W/2 THUS THE SCALING IS 8 HERE.
0443   REF  15 LAST 587   20,3171  7 1612 1          MP    TQR
0444   REF   3 LAST 495   20,3172  6 1643 1          AD    (1-K)/8    THE ALGORITHM IMPLEMENTED IS....
0445                      20,3173  0 0006 1          EXTEND               JETRATE = TQR*NJET*ACC*(1-K*N*TQR/2)
0446   REF  34 LAST 557   20,3174  7 7760 0          MP    BIT4         FOR THE Q AND R AXES RESPECTIVELY.
0447   REF  70 LAST 533   20,3175  22 061 0          XCH   ITEMP1       THE FINAL SCALING OF JETRATE IS PI/4.
0448   REF   5 LAST 588   20,3176  31'605 0          CAE   JETRATEQ
0449                      20,3177  0 0006 1          EXTEND
0450   REF  71 LAST 588   20,3200  7 0061 1          MP    ITEMP1
0451   REF   6 LAST 588   20,3201  55'605 1          TS    JETRATEQ
0452   REF   5 LAST 588   20,3202  31'606 0          CAE   JETRATER
0453                      20,3203  0 0006 1          EXTEND
0454   REF  72 LAST 588   20,3204  7 0061 1          MP    ITEMP1
0455   REF   6 LAST 588   20,3205  55'606 1          TS    JETRATER
0456   REF 201 LAST 586   20,3206  0 0002 0          TC    Q
04565                     20,3207   00632 0 1DOMSCAL DEC   0.025
0457                      20,3210   24366 1 15/25KF  DEC   0.64000
0458                      20,3211   03146 1 CSPAT1   DEC   0.10000
04585                     20,3212   77754 1 -DELAYT  DEC   -19        -11.875 MS SCALED AS TIME6.
0459                      20,3213   00240 1 CSPINKF  DEC   0.00977
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P045901 THIS INTRUPT TAKES THE SQUARE ROOT AND CALLS TORQUEVK
 045902 REF   2 LAST 585      20,3214  3 3030 1  DORUTDJM CAF    MS30120    FILDUMMY ENTRY EVERY TIME WE DO SQ. ROOT
 045904 REF  14 LAST 585      20,3215  54 030 0           TS     TIME5
 045906 REF  18 LAST 585      20,3216  22 016 0           XCH    BANKRUPT
 045908                       20,3217  0 0006 1           EXTEND
 04591  REF  16 LAST 585      20,3220  22 012 1           DXCH   DRUPT

 045912                       20,3221  0 0006 1           EXTEND
 045914 REF   2 LAST 585      20,3222  3 3032 0           DCA    PAX3NK20
 045916 REF  18 LAST 585      20,3223  53001 0            DXCH   T5ADR

 045918                       20,3224  0 0006 1           EXTEND
 04592  REF   7 LAST 551      20,3225  4 1512 1           DCS    TERMA
 045922 REF  21 LAST 515      20,3226  0 5270 1           TC     IBNKCALL
 045924 REF   2 LAST 508      20,3227   54525 1           CADR   DAPSQRT
 045926 REF  22 LAST 551      20,3230  6 1510 1           AD     TERMA
 045928                       20,3231  6 0000 1           DDUBLE                RESCALE TO T6 SCALING
 045929                       20,3232  0 0006 1           EXTEND
 04593  REF   1               20,3233  7 3244 1           MP     25/32KF
 045932 REF  16 LAST 588      20,3234  55612 1            TS     TQR
 045933 REF   1               20,3235  6 3212 0           AD     -DELAYT        TQR SHOULD HOLD THE COMPLETE ON-TIME.
 045934 REF  21 LAST 530      20,3236  55475 1            TS     TQFJTCHG
 045936 REF   3 LAST 586      20,3237  0 3105 0           TC     TORQUEVK

 045938 REF   2 LAST 551      20,3240  31654 1            CAE    CH5TEMP
 04594  REF  15 LAST 560      20,3241  7 1471 0           MASK   JTSONNOW
 045942 REF  35 LAST 586      20,3242  0 5225 1           TC     POSTJUMP
 045944 REF   1               20,3243  36500 1            CADR   FROMROOT

 045946                       20,3244  31000 0  25/32KF   DEC    0.78125
```

L KALMAN FILTER FOR LM DAP USER'S OWN PAGE NO. 17 53 E6

P0460 SUBROUTINE: DISPDRIV MOD. NO. 0 DATE: NOVEMBER 14, 1966

R0461 AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0462 THIS SUBROUTINE SETS THE ICDU DRIVE BITS EVERY OTHER TIME IT IS CALLED. IT ALWAYS CHANGES THE VALUE OF
R0464 "DISPLACT" TO INDICATE THE PASSING OF 100 MS, SINCE THIS FLAG IS TESTED BY "EIGHTBAL" IN THE P-AXIS T5RUPT.
R0466 THE ICDU IS DRIVEN ONLY 30 MS AFTER "EIGHTBAL" ENABLED IT.

R0467 CALLING SEQUENCES (FROM "DUMMYFIL" AND "FILTER"):

A0468 L TC DISPDRIV (MUST BE FROM SAME BANK)
A0469 L +1 (RETURN)

R0470 SUBROUTINES CALLED: NONE. NORMAL EXIT: BY TC Q TO L +1 .

R0471 ALARM/ABORT MODES: NONE. INPUT: PRESENT VALUE IN DISPLACT .

R0472 OUTPUT: OPPOSITE VALUE OF "DISPLACT" AND ICDU BITS (WHEN NECESSARY).

R0473 DEBRIS: A,Q.

```
0474   REF  24 LAST 585                    E6              EBANK= DT
0475                                    21,2561            BANK   21
0476   REF   2 LAST 488      21,2561  11'515 0  DISPDRIV  CCS    DISPLACT     TEST PHASE OF  EIGHTBAL .
0477                         21,2562  1 2567 0            TCF    +5           (NO DRIVING ON THIS PASS.) RESET FLAG.

0478   REF   1               21,2563  3 2571 0            CAF    OCT70000     SET ICDU DRIVE BITS.
0479                         21,2564  0 0006 1            EXTEND
0480                         21,2565  05 014 1            WOR    14

0481   REF 138 LAST 579      21,2566  3 7763 1            CAF    ONE          RESET FLAG.
0482   REF   3 LAST 590      21,2567  55'515 0            TS     DISPLACT

0483   REF 202 LAST 588      21,2570  0 0002 0            TC     Q            RETURN

0484                         21,2571   70000 0  OCT70000  OCTAL  70000        ICDU DRIVE BITS OF CHANNEL 14.
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L TRIM GIMBAL CONTROL SYSTEM USER'S OWN PAGE NO. 1 S3

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00001                                21,2572          BANK   21
00002  REF  25 LAST 590                 E6            EBANK= DT
R0001  CONTROL REACHES THIS POINT UNDER EITHER OF THE FOLLOWING TWO CONDITIONS ONCE THE DESCENT ENGINE AND THE DIGITAL
R0003  AUTOPILOT ARE BOTH ON:
R0004            A) THE TRIM GIMBAL CONTROL LAW WAS ON DURING THE PREVIOUS Q,R-AXIS TIME5 INTERRUPT (OR THE DAPIDLER
R0006               INITIALIZATION WAS SET FOR TRIM GIMBAL CONTROL AND THIS IS THE FIRST PASS), OR
R0008            B) THE Q,R-AXIS RCS JET CONTROL LAW ATTITUDE STEERING MODE REDUCED THE ATTITUDE ERROR TO LESS THAN
R0010  1DEGREE ON EACH AXIS ON ITS LAST TIME5 INTERRUPT.

R0011  THE FOLLOWING T5RUPT ENTRY BEGINS THE TRIM GIMBAL CONTROL LAW.  SINCE IT IS ASSUMED THAT THE LEM WILL REMAIN
R0013  UNDER TRIM GIMBAL CONTROL, A KALMAN FILTER RUPT IS SET UP TO BEGIN 30 MS FROM THE TRIM GIMBAL RUPT.

0015   REF   3 LAST 574    21,2572  3 2402 0  GIS      CAF    MS30F      RESET TIMER IMMEDIATELY: DT = 30 MS
0016   REF  15 LAST 589    21,2573  54 030 0           TS     TIME5

0017   REF  19 LAST 589    21,2574  22 016 0           LXCH   BANKRUPT   INTERRUPT LEAD IN (CONTINUED)
0018                        21,2575  0 0006 1           EXTEND
0019   REF  17 LAST 589    21,2576  22 012 1           QXCH   QRUPT

0020                        21,2577  0 0006 1           EXTEND
0021   REF   3 LAST 585    21,2600  3 2411 1           DCA    POSTPFIL
0022   REF  19 LAST 589    21,2601  53'001 0           DXCH   T5ADR

0023   REF   1              21,2602  1 2674 1           TCF    GTSTEST    SKIP OVER XFORMS UNTIL REORGANIZATION

0024                        21,2603  0 0006 1  GIMBAL   EXTEND            GET D.P. FILTERED CDUY VALUE (ONES COMP)
0025   REF   4 LAST 580    21,2604  3 1554 1           DCA    CDUYFIL    SCALED AT 2PI RADIANS
0026   REF   2 LAST 578    21,2605  0 2307 1           TC     ONETOTWO   FORM S.P. VALUE IN TWOS COMPLEMENT AT PI
0027                        21,2606  0 0006 1           EXTEND
0028   REF   6 LAST 533    21,2607  20 767 0           MSU    CDUYD      FORM Y-AXIS ERROR IN ONES COMPLEMENT
0029   REF   2 LAST 534    21,2610  55'467 1           TS     QDIFF      (SAVE IN Q-AXIS ERROR LOC: EFFICIENCY)

0030                        21,2611  0 0006 1           EXTEND            GET D.P. FILTERED CDUZ VALUE (ONES COMP)
0031   REF   2 LAST 580    21,2612  3 1556 0           DCA    CDUZFIL    SCALED AT 2PI RADIANS
0032   REF   3 LAST 591    21,2613  0 2307 1           TC     ONETOTWO   FORM S.P. VALUE IN TWOS COMPLEMENT AT PI
0033                        21,2614  0 0006 1           EXTEND
0034   REF   3 LAST 533    21,2615  20 770 0           MSU    CDUZD      FORM Z-AXIS ERROR IN ONES COMPLEMENT
0035   REF   1              21,2616  55'470 1           TS     RDIFF      (SAVE IN R-AXIS ERROR LOC: EFFICIENCY)

R0036  TRANSFORM Y,Z CDU ERRORS TO THE Q,R-AXES.

0037                        21,2617  0 0006 1           EXTEND            GET BOTH Y AND Z CDU ERRORS AT PI RAD
0038   REF   3 LAST 591    21,2620  3 1470 0           DCA    QDIFF
0039   REF   1              21,2621  0 3264 1           TC     QTRANSF    FORM Q-ERROR IN A (SCALED AT PI RAD)
0040   REF   4 LAST 591    21,2622  53'470 1           DXCH   QDIFF      STORE Q-ERROR, GET BOTH Y,Z CDU ERRORS
0041   REF   1              21,2623  0 3274 0           TC     RTRANSF    FORM R-ERROR IN A (SCALED AT PI RAD)
0042   REF   2 LAST 591    21,2624  57'470 0           XCH    RDIFF      STORE R-ERROR

R0043  TRANSFORM THE FILTERED Y,Z RATES TO THE Q,R-AXES.
R0044  (THESE MAY BE NEEDED FOR THE RATE DERIVATION FOR THE JETS IF THEY MUST BE USED.)
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L TRIM GIMBAL CONTROL SYSTEM USER'S OWN PAGE NO. 2 S3 E6

```
0046   REF   3 LAST 580    21,2625  31'561 1        CAE    DCDJZFIL      GET FILTERED Y,Z RATES
0047   REF 127 LAST 587    21,2626  54 001 1        TS     L             SCALED AT PI/4 RADIANS/SECOND
0048   REF   4 LAST 580    21,2627  31'557 1        CAE    DCDJYFIL
0049   REF   2 LAST 591    21,2630  0 3264 1        TC     QTRANSF       FOR Q-AXIS RATE
0050   REF   9 LAST 562    21,2631  55'416 1        TS     OMEGAQ        STORED SCALED AT PI/4 RADIANS/SECOND

0051   REF   4 LAST 592    21,2632  31'561 1        CAE    DCDJZFIL      GET FILTERED Y,Z RATES
0052   REF 128 LAST 592    21,2633  54 001 1        TS     L             SCALED AT PI/4 RADIANS/SECOND
0053   REF   5 LAST 592    21,2634  31'557 1        CAE    DCDJYFIL
0054   REF   2 LAST 591    21,2635  0 3274 0        TC     RTRANSF       FOR R-AXIS RATE
0055   REF  11 LAST 549    21,2636  55'420 1        TS     OMEGAR        STORED SCALED AT PI/4 RADIANS/SECOND

R0056  TRANSFORM THE FILTERED Y,Z ACCELERATIONS TO THE Q,R-AXES.
R0057  (THESE MAY BE NEEDED TO CALCULATE TRIM GIMBAL OFF-TIMES IF ATTITUDE ERROR HAS GONE BEYOND TRIM GIMBAL CONTROL.)

0059   REF   3 LAST 580    21,2637  31'565 0        CAE    D2CDUZFL      GET FILTERED Y,Z ACCELERATIONS
0060   REF 129 LAST 592    21,2640  54 001 1        TS     L             SCALED AT PI/8 RADIANS/SECOND(2)
0061   REF   5 LAST 580    21,2641  31'563 0        CAE    D2CDUYFL
0062   REF   3 LAST 592    21,2642  0 3264 1        TC     QTRANSF       FORM Q-AXIS ACCELERATION
0063   REF   3 LAST 491    21,2643  55'417 0        TS     ALPHAQ        STORE AT PI/8 RADIANS/SECOND(2)

0064   REF   4 LAST 592    21,2644  31'565 0        CAE    D2CDUZFL      GET FILTERED Y,Z ACCELERATIONS
0065   REF 130 LAST 592    21,2645  54 001 1        TS     L             SCALED AT PI/8 RADIANS/SECOND(2)
0066   REF   6 LAST 592    21,2646  31'563 0        CAE    D2CDUYFL
0067   REF   3 LAST 592    21,2647  0 3274 0        TC     RTRANSF       FORM R-AXIS ACCELERATION
0068   REF   3 LAST 488    21,2650  55'421 0        TS     ALPHAR        STORE AT PI/8 RADIANS/SECOND(2)

R0069  EXTRAPOLATE THETA AND OMEGA OVER 100 MS PLUS THE 20 MS DELAY BETWEEN THE KALMAN FILTER AND TRIM GIMBAL
R00705  CONTROL, REFLECTING MECHANICAL LAG.

0071   REF  10 LAST 592    21,2651  31'416 0        CAE    OMEGAQ
0072                       21,2652  0 0006 1        EXTEND
0073   REF   1             21,2653  7 2672 1        MP     DTW
0074   REF   5 LAST 591    21,2654  27'467 1        ADS    QDIFF

0075   REF  12 LAST 592    21,2655  31'420 0        CAE    OMEGAR
0076                       21,2656  0 0006 1        EXTEND
0077   REF   2 LAST 592    21,2657  7 2672 1        MP     DTW
0078   REF   3 LAST 591    21,2660  27'470 1        ADS    RDIFF

0079   REF   4 LAST 592    21,2661  31'417 1        CAE    ALPHAQ
0080                       21,2662  0 0006 1        EXTEND
0081   REF   1             21,2663  7 2673 0        MP     DTA
0082   REF  11 LAST 592    21,2664  27'416 1        ADS    OMEGAQ

0083   REF   4 LAST 592    21,2665  31'421 1        CAE    ALPHAR
0084                       21,2666  0 0006 1        EXTEND
0085   REF   2 LAST 592    21,2667  7 2673 0        MP     DTA
0086   REF  13 LAST 592    21,2670  27'420 1        ADS    OMEGAR
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L TRIM GIMBAL CONTROL SYSTEM USER'S OWN PAGE NO. 3 S3 E6

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 0087   REF  43 LAST 586     21,2671  1 5733 1            TCF    RESUME

 0088                        21,2672   00754 1  DTW       DCT    00754          120 MS SCALED AT 4
 0089                        21,2673   01727 1  DTA       DCT    01727          120 MS SCALED AT 2
R0090   TEST TO SEE IF TRIM GIMBAL CONTROL LAW HAS KEPT BOTH ATTITUDE ERRORS BELOW THE 1 DEGREE BOUNDARY WITH THE REGION
R0092   OF RCS CONTROL LAW DOMINANCE OR IS STILL REDUCING THE ERROR.

 0093   REF   2 LAST 474     21,2674  3 7762 0  GTSTEST   CAF    TRYGTMBL       VERIFY THAT GTS IS STILL OPERATIVE.
 0094   REF  48 LAST 559     21,2675  7 0077 0            MASK   DAPBOOLS
 0095   REF 253 LAST 580     21,2676  10 000 0            CCS    A
 0096   REF   1              21,2677  1 2731 1            TCF    RCSCNTRL       GTS NOT OPERATIVE
R00965  START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

 0097   REF   1              21,2700  1 3736 1  INSERT21  TCF    CHKCNTR        GO CHECK TRIMCNTR (AT END OF BANK 21).

R00975  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

 0098   REF  19 LAST 579     21,2701  54 066 0  LOOPTEST  TS     ORCNTR
 0099   REF  20 LAST 593     21,2702  50 066 1            INDEX  ORCNTR
 0100   REF   6 LAST 592     21,2703  11'467 1            CCS    QDIFF          SCALED AT PI.
 0101   REF   1              21,2704  6 2727 1            AD     -TGBND+1       -2 DEG SCALED AT PI, + 1 BIT.
 0102                        21,2705  1 2707 1            TCF    +2
 0103   REF   2 LAST 593     21,2706  6 2727 1            AD     -TGBND+1
 0104                        21,2707  0 0006 1            EXTEND
 0105                        21,2710  6 2712 1            BZMF   +2             IS ERROR MAG LESS,EQUAL 2 DEG.
 0106   REF   1              21,2711  1 3715 0            TCF    TESTPCTR       NO.  MAY CONTINUE,THOUGH.
 0107   REF  21 LAST 593     21,2712  3 0066 1            CA     ORCNTR         YES.  TRY RATE MAGNITUDE.
 0108                        21,2713  6 0000 1            DOUBLE
 0109   REF 264 LAST 593     21,2714  50 000 1            INDEX  A
R01095
R01096  THIS TEST BYPASSES THE TEST IN WSFTEST.  CHECK WSFTEST IF BOUND CHANGES.

 0110   REF  12 LAST 592     21,2715  11'416 1            CCS    OMEGAQ         SCALED AT PI/4.
 0111   REF   1              21,2716  6 2730 1            AD     -RATBD+1       -.65 DEG/SEC SCALED AT PI/4  + 1 BIT
 0112                        21,2717  1 2721 0            TCF    +2
 0113   REF   2 LAST 593     21,2720  6 2730 1            AD     -RATBD+1
 0114                        21,2721  0 0006 1            EXTEND
 0115                        21,2722  6 2724 1            BZMF   +2             IS RATE MAG LESS,EQUAL .65 DEG/SEC.
 0116   REF   2 LAST 593     21,2723  1 3715 0            TCF    TESTPCTR       NO.  MAY CONTINUE,THOUGH.
 0117   REF  22 LAST 593     21,2724  10 066 0            CCS    ORCNTR         YES.  THIS AXIS IS FINE, ARE BOTH DONE.
 0118   REF   1              21,2725  1 2701 1            TCF    LOOPTEST       TRY THE Q AXIS NOW.
 0119   REF   1              21,2726  1 3000 0            TCF    GTSRAXIS       USE TRIM GIMBAL CONTROL.
 0120                        21,2727   77512 1  -TGBND+1  DCT    77512          -2 DEG SCALED AT PI, + 1 BIT.
 0121                        21,2730   77423 1  -RATBD+1  DCT    77423          -.65 DEG/SEC SCALED AT PI/4  + 1 BIT
R0126   ATTITUDE ERROR IS BEYOND TRIM GIMBAL CONTROL LAW RANGE.  SET UP FOR RCS CONTROL LAW (Q,R-AXIS) AND CALCULATE
R0128   TIMES TO TURN OFF THE GIMBAL DRIVES.

 0129                        21,2731  0 0006 1  RCSCNTRL  EXTEND                 CHANGE LOCATION OF NEXT T5RUPT FROM FIL-
 0130   REF   1              21,2732  3 2756 1            DCA    POSTORFL       TER TO FILDUMMY.  AHEM, DON'T FORGET
01305   REF  20 LAST 591     21,2733  53'001 0            DXCH   T5ADR          THAT FILDUMMY MOVED TO BANK20, DICK SOSS
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L TRIM GIMBAL CONTROL SYSTEM USER'S OWN PAGE NO. 4 S3 E6

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 0131                                21,2734  0 0006 1             EXTEND                  SET UP POST P-AXIS TSRUPT TO GO TO
 0132   REF   1                     21,2735  3 2760 1             DCA     QRUPFILT        DUMMYFIL INSTEAD OF FILTER.  USE 2CADR
 0133   REF   4 LAST 5800          21,2736  53'573 0             DXCH    PFILTADR        BECAUSE DUMMYFIL NOW IN BANK 16.

 0135                                21,2737  0 0006 1             EXTEND
 0136   REF  21 LAST 575           21,2740  3 0034 0             DCA     CDUY
 0137   REF   4 LAST 519           21,2741  53'430 0             DXCH    OLDYERQ         PREPARE FOR SEQUENCED RESUMPTION OF
                                                                                         Q,R-AXIS RCS CONTROL RATE DERIVATION
                                                                                         BY PROVIDING OLD CDU READINGS

 0138                                21,2742  0 0006 1             EXTEND
 0139   REF   7 LAST 593           21,2743  3 1470 0             DCA     QDIFF           MOVE FILTERED AND TRANSFORMED ATTITUDE
 0140   REF   9 LAST 545           21,2744  57'413 0             XCH     ER              ERRORS INTO ERASABLE FOR Q,R-AXIS RCS
 0141   REF  30 LAST 5490          21,2745  23'411 1             LXCH    E               CONTROL URGENCY CALCULATIONS.

 0142   REF 139 LAST 5900          21,2746  3 7763 1             CAF     ONE
 0143   REF  71 LAST 523           21,2747  0 5663 1             TC      WAITLIST
 01431  REF  26 LAST 591                       E6                EBANK=  DT
 0144                               21,2750   02763 1             2CADR   CHEKDRIV          DO TGOFF CALCULATION IN WAITLIST TASK
C0144   REF   1                     21,2751   42066 1
 0145                               21,2752  0 0006 1             EXTEND                  GO TO Q,R-AXES CONTROL IMMEDIATELY
 0146   REF   1                     21,2753  3 2762 0             DCA     TGENTRY
 0147                               21,2754  52 006 0             DTCB

 0149   REF  16 LAST 589                       E6                EBANK=  JTSONNOW        NO, SURELY YOU JEST, NOT EBANK 5, AGAIN?
 01493                              21,2755   03033 1  POSTQRFL   2CADR   FILDUMMY        WATCH OUT FOR BANK SWITCHING D. GOSS
C01493  REF   2 LAST 519           21,2756   40066 0
 01495  REF   7 LAST 520                       E6                EBANK=  ADSQTERM
 0150                               21,2757   03642 1  QRUPFILT   2CADR   DUMMYFIL        NECESSARY BECAUSE DUMMYFIL IN BANK 16.
C0150   REF   2 LAST 491           21,2760   34066 0
 01501  REF  27 LAST 594                       E6                EBANK=  DT
 0151                               21,2761   02715 0  TGENTRY    2CADR   STILLRCS
C0151   REF   4 LAST 534           21,2762   36066 1

R0152   START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

 0153   REF   1                     21,2763  11'736 0  CHEKDRIV   CCS     PASSCTR         ENOUGH FILTER PASSES FOR DRIVE DONE?
 01531  REF   1                     21,2764  1 2766 0             TCF     COLDFILT          NO.  JUST STOP DRIVES.
 01532  REF   1                     21,2765  1 3745 0             TCF     WARMFILT          YES.  CALCULATE TIMES (END OF BANK).

 0154   REF 197 LAST 587           21,2766  3 7767 0  COLDFILT   CAF     ZERO            FILTER NOT WARM YET. TURN OFF DRIVES.
 0155   REF   5 LAST 5800          21,2767  55'523 0             TS      NEGJQ
 0156   REF   5 LAST 5800          21,2770  55'525 0             TS      NEGJR
 0157   REF   4 LAST 585           21,2771  55'533 1             TS      QACCDOT
 0158   REF   3 LAST 585           21,2772  55'535 1             TS      RACCDOT
 0159   REF   2 LAST 495           21,2773  0 3243 1             TC      WRCHN12
 0160   REF  56 LAST 523           21,2774  1 5727 1             TCF     TASKOVER

 01611  REF  33 LAST 586           21,2775  0 4736 1             TC      CCSHOLE           FILLER (TO PRESERVE ADDRESSES)
 01612  REF  34 LAST 594           21,2776  0 4736 1             TC      CCSHOLE           FILLER (TO PRESERVE ADDRESSES)
R01619  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967**********
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P0162   THE DRIVE SETTING ALGORITHM
R0163   DEL = SGN(OMEGA*K + SGN(ALPHA)ALPHA(2)/2)     ONLY +1/-1

R0164   NEGUSUM = ERROR*K(2) + DEL(OMEGA*K*DEL + ALPHA(2)/2)(3/2) + ALPHA(OMEGA*K*DEL + ALPHA(2)/3)

R0166   DRIVE = -SGN(NEGUSUM)

 0167                        21,2777   76504 1  -.04266  DEC    -.04266
 0168   REF  77 LAST 576     21,3000   3 7762 0  GTSRAXIS CAF    TWO          SET INDEXER FOR R-AXIS CALCULATIONS
 0169   REF  23 LAST 593     21,3001   54 066 0           TS     QRCNTR
 0170   REF   1              21,3002   1 3712 1           TCF    JSJALXIT

 0171   REF 138 LAST 594     21,3003   3 7767 0  GOQTRIMG CAF    ZERO         SET INDEXER FOR Q-AXIS CALCULATIONS
 0172   REF  24 LAST 595     21,3004   54 066 0           TS     QRCNTR

 0173                        21,3005   0 0006 1  GTSQAXIS EXTEND
 0174   REF  25 LAST 595     21,3006   5 0066 1           INDEX  QRCNTR       PICK UP K AND K(2) FOR THIS AXIS
 0175   REF   4 LAST  52     21,3007   3 1527 0           DCA    KQ
 0176   REF   1              21,3010   52 062 1           DXCH   KCENTRAL

 0177                        21,3011   0 0006 1           EXTEND
 0178   REF  26 LAST 595     21,3012   5 0066 1           INDEX  QRCNTR       PICK UP OMEGA AND ALPHA FOR THIS AXIS
 0179   REF  13 LAST 593     21,3013   3 1417 1           DCA    OMEGAQ
 0180   REF   1              21,3014   52 064 1           DXCH   WCENTRAL

 0181   REF  27 LAST 595     21,3015   10 066 0           CCS    QRCNTR       RDIFF IS STORED IMMEDIATELY FOLLOWING
 0182   REF 265 LAST 593     21,3016   50 000 1           INDEX  A            QDIFF, WITH NO SEPARATING CELL.
 0183   REF   8 LAST 594     21,3017   31,467 0           CAE    QDIFF

R0184   QDIFF IS LESS,EQUAL 2 DEG. AND IS SCALED AT 180 DEG.  RESCALE AT 180/64 DEG. = 2 + 13/16 DEG. = PI/64 RADIANS.

 0187                        21,3020   0 0006 1           EXTEND               RESCALE DIFFERENCE BY MULTIPLYING BY
 0188   REF  35 LAST 579     21,3021   7 7755 0           MP     BIT7          2(6)
 0189   REF   1              21,3022   22 071 1           XCH    ETHETA

 0190   REF   2 LAST 595     21,3023   30 061 0           CAE    KCENTRAL      TEST ON MAGNITUDE OF ACCDOT
 0191   REF   1              21,3024   6 2777 1           AD     -.04266
 0192                        21,3025   0 0006 1           EXTEND
 0193   REF   1              21,3026   6 3034 0           BZMF   ACCDOTSM      BRANCH IF ACCDOT IS SMALL

 0194   REF  40 LAST 580     21,3027   3 7746 0  ACCDOTLG CAF    BIT14         ACCDOT IS COMPARITIVELY LARGE
 0195   REF   1              21,3030   54 072 0           TS     SF1           SET UP SCALE FACTORS
 0196   REF  23 LAST 553     21,3031   3 7750 1           CAF    BIT12
 0197   REF   1              21,3032   54 073 1  WSFTEST  TS     SF2

R01975  LOOPTEST CODING BYPASSES THE OMEGA MAGNITUDE TEST, BUT A CHANGE IN THE TEST BOUNDS COULD REQUIRE ITS USE AGAIN.

R0198           CCS    WCENTRAL      TEST ON MAGNITUDE OF OMEGA
R0199           AD     -.04438
R01991          TCF    +2
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L TRIM GIMBAL CONTROL SYSTEM USER'S OWN PAGE NO. 6 S3 E6

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R01992          AD     -.04438
R0200           EXTEND
R0201           BZMF   ASFTEST          IF SMALL, GO TO ALPHA TEST
R0202           TCF    WLARGE
 02025  REF   1                 21,3033  1 3050 0          TCF    ASFTFST        OMEGA IS ALWAYS BOUNDED BY .65 DEG/SEC.
 0203   REF   3 LAST 595        21,3034  30 061 0  ACCDOTSM CAE    KCENTRAL       RESCALE IF ACCDOT IS SMALL
 0204                           21,3035  0 0006 1          EXTEND
 0205   REF  26 LAST 587        21,3036  7 7757 1          MP     BIT5           RESCALE K BY MULTIPLYING BY 2(4)
 0206   REF   4 LAST 596        21,3037  22 061 0          LXCH   KCENTRAL
 0207   REF   5 LAST 596        21,3040  30 061 0          CAE    KCENTRAL
 0208                           21,3041  0 0006 1          EXTEND
 0209                           21,3042  7 0000 0          SQUARE
 0210   REF   1                 21,3043  54 062 1          TS     K2CNTRAL
 0211   REF  39 LAST 577        21,3044  3 7752 0          CAF    BIT10          SET UP VARIABLE SCALE FACTORS
 0212   REF   2 LAST 595        21,3045  54 072 0          TS     SF1
 0213   REF  35 LAST 588        21,3046  3 7760 1          CAF    BIT4
 0214   REF   1                 21,3047  1 3032 1          TCF    WSFTEST        GO TEST ON MAGNITUDE OF OMEGA

 0215   REF   1                 21,3050  10 064 1  ASFTEST CCS    ACENTRAL       TEST ON MAGNITUDE OF ALPHA
 0216   REF   1                 21,3051  6 3057 0          AD     -.08882
 02161                          21,3052  1 3054 1          TCF    +2
 02162  REF   2 LAST 596        21,3053  6 3057 0          AD     -.08882
 0217                           21,3054  0 0006 1          EXTEND
 0218   REF   1                 21,3055  6 3060 1          BZMF   WARESCAL       IF SMALL, GO TO W,A RESCALING
 0219   REF   1                 21,3056  1 3071 0          TCF    WLARGE         IF LARGE, DO SAME AS IF W LARGE

R0220   -.04438 DEC    -.04438
 0221                           21,3057   75120 0 -.08882  DEC    -.08882

 0222   REF   2 LAST 595        21,3060  30 063 1  WARESCAL CAE    WCENTRAL       RESCALE OMEGA BY MULTIPLYING BY 2(4)
 0223                           21,3061  0 0006 1          EXTEND
 0224   REF  27 LAST 596        21,3062  7 7757 1          MP     BIT5
 0225   REF   3 LAST 596        21,3063  22 063 1          LXCH   WCENTRAL

 0226   REF   2 LAST 596        21,3064  30 064 0          CAE    ACENTRAL       RESCALE ALPHA BY MULTIPLYING BY 2(3)
 0227                           21,3065  0 0006 1          EXTEND
 0228   REF  36 LAST 596        21,3066  7 7760 0          MP     BIT4
 0229   REF   3 LAST 596        21,3067  22 064 0          LXCH   ACENTRAL

 0230   REF   1                 21,3070  1 3101 0          TCF    ALGORTHM

 0231   REF   3 LAST 596        21,3071  30 072 1  WLARGE  CAE    SF1            RESCALE VARIABLE SCALE FACTORS
 0232                           21,3072  0 0006 1          EXTEND
 0233   REF  21 LAST 553        21,3073  7 7747 0          MP     BIT13          SF1 = SF1*2(-2)
 0234   REF   4 LAST 596        21,3074  54 072 0          TS     SF1
 0235   REF   2 LAST 595        21,3075  30 073 0          CAE    SF2
 0236                           21,3076  0 0006 1          EXTEND
 0237   REF  39 LAST 555        21,3077  7 7756 0          MP     BIT6           SF2 = SF2*2(-9)
 0238   REF   3 LAST 596        21,3100  54 073 1          TS     SF2
```

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```
0239   REF   2 LAST 595    21,3101  30 071 1  ALGORITHM CAE    ETHETA      GET RESCALED ERROR THETA
0240                       21,3102  0 0006 1            EXTEND
0241   REF   2 LAST 596    21,3103  7 0062 1            MP     K2CNTRAL    FORM K(2)*THETA IN D.P.
0242                       21,3104  0 0006 1            EXTEND
0243   REF   4 LAST 596    21,3105  7 0073 1            MP     SF2         CALCULATE AND STORE
0244   REF   1              21,3106  54 070 1            TS     K2THETA     K(2)*THETA*SF2 IN K2THETA

0245   REF   4 LAST 596    21,3107  3 0063 1            CA     WCENTRAL    CALCULATE AND STORE
0246                       21,3110  0 0006 1            EXTEND             K*OMEGA*SF1 IN OMEGA.K
0247   REF   6 LAST 596    21,3111  7 0061 1            MP     KCENTRAL
0248                       21,3112  0 0006 1            EXTEND
0249   REF   5 LAST 596    21,3113  7 0072 0            MP     SF1
0250   REF   1              21,3114  54 061 1            TS     OMEGA.K

0251   REF   4 LAST 596    21,3115  3 0064 0            CA     ACENTRAL
0252                       21,3116  0 0006 1            EXTEND             BY REDESIGNATION OF THE SCALE FACTOR.
0253   REF 266 LAST 595    21,3117  7 0000 0            MP     A           THIS PRODUCT BECOMES ALPHA(2)/2
0254   REF   1              21,3120  54 072 0            TS     A2CNTRAL    INSTEAD OF  ALPHA(2)

0255   REF   5 LAST 597    21,3121  10 064 1            CCS    ACENTRAL
0256   REF   2 LAST 597    21,3122  3 0072 1            CA     A2CNTRAL
0257                       21,3123  1 3125 0            TCF    +2
0258   REF   3 LAST 597    21,3124  4 0072 0            CS     A2CNTRAL    NOW THE A REGISTER CONTAINS
0259   REF   2 LAST 597    21,3125  6 0061 0            AD     OMEGA.K     K*OMEGA + ALPHA*ABS(ALPHA)/2

0260   REF 257 LAST 597    21,3126  10 000 0            CCS    A
0261   REF  40 LAST 522    21,3127  3 7763 1            CA     BIT1        DEL = SIGNUM(A) , (ZERO WHEN A IS ZERO),
0262                       21,3130  1 3132 0            TCF    +2          PLUS ONE OR MINUS ONE OTHERWISE.
0263   REF  41 LAST 597    21,3131  4 7763 0            CS     BIT1
0264   REF   1              21,3132  54 065 0            TS     DEL

0265   REF   2 LAST 597    21,3133  10 065 0            CCS    DEL
0266   REF   3 LAST 597    21,3134  3 0061 0            CA     OMEGA.K
0267                       21,3135  1 3137 0            TCF    +2
0268   REF   4 LAST 597    21,3136  4 0061 1            CS     OMEGA.K     DEL*OMEGA.K REPLACES OMEGA.K
0269   REF   5 LAST 597    21,3137  54 061 1            TS     OMEGA.K

0273   REF   4 LAST 597    21,3140  6 0072 1            AD     A2CNTRAL    DEL*OMEGA.K + ALPHA(2)/2
0274   REF   2 LAST 552    21,3141  57,521 0            XCH    FUNCTION    STORED IN FUNCTION

0275   REF   5 LAST 597    21,3142  3 0072 1            CA     A2CNTRAL
0276                       21,3143  0 0006 1            EXTEND             CALCULATE ALPHA(2)/3
0277   REF   1              21,3144  7 3304 1            MP     .66667
0278   REF   6 LAST 597    21,3145  6 0061 0            AD     OMEGA.K
0279                       21,3146  0 0006 1            EXTEND
0280   REF   6 LAST 597    21,3147  7 0064 1            MP     ACENTRAL    K(2)*THETA+ALPHA*(DEL*OMEG.K+ALPHA(2)/3)
0281   REF   2 LAST 597    21,3150  26 070 1            ADS    K2THETA     FIRST AND SECOND TERMS SUMMED HERE.

R02815 THE FOLLOWING SECTION CALCULATES .707*DEL*FUNCTION(3/2) AND ADDS IT TO THE OTHER TWO TERMS OF NEGUSUM.
```

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```
0282  REF  21 LAST 553   21,3151  3 0021 1          CA    SR          CALL SEQUENCE FOR SPROOT REQUIRES THAT
0283  REF 258 LAST 597   21,3152  6 0000 1          AD    A           SR BE PRESERVED BY THE CALLER.
0284  REF   4 LAST 580   21,3153  57'540 1          XCH   STORCDUY    THE KALMAN FILTER STORES INTO THE CELL
0285  REF   3 LAST 597   21,3154  3 1521 0          CA    FUNCTION    STORCDUY BEFORE USING IT OTHERWISE.
0286  REF   3 LAST 553   21,3155  0 5417 0          TC    SPROOT
0287  REF   5 LAST 598   21,3156  23'540 1          LXCH  STORCDUY
0288  REF  22 LAST 598   21,3157  22 021 1          LXCH  SR

0289                     21,3160  0 0006 1          EXTEND
0290  REF   4 LAST 598   21,3161  7 1521 1          MP    FUNCTION
0291  REF   6 LAST 598   21,3162  57'540 1          XCH   STORCDUY
0292  REF   3 LAST 597   21,3163  10 065 0          CCS   DEL
0293  REF   1            21,3164  3 3305 1          CA    .707GTS     THIS CELL CONTAINS SQUARE ROOT OF 1/2
0294                     21,3165  1 3167 0          TCF   +2
0295  REF   2 LAST 598   21,3166  4 3305 0          CS    .707GTS
0296                     21,3167  0 0006 1          EXTEND
0297  REF   7 LAST 598   21,3170  7 1540 0          MP    STORCDUY
0298  REF   3 LAST 597   21,3171  6 0070 0          AD    K2THETA     NEGUSUM IS COMPLETE.

0299  REF 259 LAST 598   21,3172  10 000 0          CCS   A           SIGNUM(NEGUSUM) IS NEGATIVE OF THE SIGN
0300  REF  42 LAST 597   21,3173  3 7763 1          CA    BIT1        WHICH WILL BE ATTACHED TO THE NEW VALUE
0301  REF   1            21,3174  1 3176 0          TCF   POSDRIVE    OF Q(R)ACCDOT.
0302  REF  43 LAST 598   21,3175  4 7763 0          CS    BIT1

0303  REF  28 LAST 595   21,3176  50 066 1 POSDRIVE INDEX  QRCNTR      SIGN OF NEW Q(R)ACCDOT OPPOSES THIS SIGN
0396  REF   6 LAST 594   21,3177  55'523 0          TS    NEGJQ

0397                     21,3200  4 0000 0          COM
0398                     21,3201  0 0006 1          EXTEND              SEND BACK JERK TERM
0399  REF  14 LAST 587   21,3202  5 0066 1          INDEX ITEMP6
0400  REF   4 LAST  52   21,3203  7 1532 0          MP    ACCDOTQ
0401  REF  15 LAST 598   21,3204  50 066 1          INDEX ITEMP6
0402  REF   4 LAST 585   21,3205  23'733 1          LXCH  QACDOTMP      STORE FOR 100 MS, THEN RELEASE TO FILTER
0403  REF  29 LAST 598   21,3206  10 066 0          CCS   QRCNTR        LOOP COUNTER
0404  REF   1            21,3207  0 1737 0          TC    SLECTLAW    2ND PASS.  (FOR Q-AXIS)
R0405 TRANSFORM JERKS BACK TO GIMBAL AXES.

0406  REF   5 LAST 594   21,3210  4 1533 1          CS    QACCDOT     SCALED AT PI/2(7), AND COMPLEMENTED.
0407                     21,3211  0 0006 1          EXTEND
0408  REF   2 LAST 136   21,3212  7 1400 0          MP    MR12        SCALED AT 2
0409  REF   3 LAST 580   21,3213  55'567 0          TS    Y3DOT
0410  REF   4 LAST 594   21,3214  4 1535 1          CS    RACCDOT     SCALED AT PI/2(7), AND COMPLEMENTED.
0411                     21,3215  0 0006 1          EXTEND
0412  REF   2 LAST 136   21,3216  7 1402 1          MP    MR13        SCALED AT 2
0413  REF   4 LAST 598   21,3217  27'567 0          ADS   Y3DOT
0414  REF   5 LAST 598   21,3220  27'567 0          ADS   Y3DOT       SCALED AT PI/2(7)

0415  REF   6 LAST 598   21,3221  4 1533 1          CS    QACCDOT     SCALED AT PI/2(7), AND COMPLEMENTED.
0416                     21,3222  0 0006 1          EXTEND
0417  REF   2 LAST  49   21,3223  7 1401 1          MP    MR22        SCALED AT 1
```

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0418  REF   2 LAST 580   21,3224  55'571 1          TS    Z3DOT
0419  REF   5 LAST 598   21,3225  4 1535 1          CS    RACCDOT     SCALED AT PI/2(7), AND COMPLEMENTED.
0420                      21,3226  0 0006 1          EXTEND
0421  REF   2 LAST  49   21,3227  7 1403 0          MP    MR23        SCALED AT 1
0422  REF   3 LAST 599   21,3230  27'571 1          ADS   Z3DOT       SCALED AT PI/2(7)

0423  REF   3 LAST 594   21,3231  0 3243 1          TC    WRCHN12     SEND GIMBAL DRIVES TO SERVOS
0424  REF  44 LAST 593   21,3232  1 5733 1          TCF   RESJME      WAIT UNTIL NEXT TRIM GIMBAL RUPT

R0425  WAITLIST TASKS TO SET TRIM GIMBAL TURN OFF BITS.

0426  REF 199 LAST 595   21,3233  3 7767 0  OFFGIMQ  CAF   ZERO      SET Q-AXIS FLAG TO ZERO
0427  REF   7 LAST 598   21,3234  55'523 0          TS    NEGJQ
0428                      21,3235  1 3240 0          TCF   +3
0429  REF 200 LAST 599   21,3236  3 7767 0  OFFGIMR  CAF   ZERO      SET R-AXIS FLAG TO ZERO
0430  REF   6 LAST 594   21,3237  55'525 0          TS    NEGJR
0431  REF   4 LAST 599   21,3240  0 3243 1          TC    WRCHN12     FLAGS TO CHANNEL BITS
0432  REF  57 LAST 594   21,3241  1 5727 1          TCF   TASKOVER

R0433  THE WRCHN12 SUBROUTINE SETS BITS 9,10,11,12 OF CHANNEL 12 ON THE BASIS OF THE CONTENTS OF NEGUQ,NEGUR WHICH ARE
R0435  THE NEGATIVES OF THE TRIM GIMBAL DESIRED DRIVES.

0436                      21,3242   07400 1  BGIM     OCTAL  07400
0437  REF  16 LAST 598                0066  CHNL12   EQUALS ITEMP6

0442  REF   8 LAST 599   21,3243  11'523 0  WRCHN12  CCS   NEGJQ
0443  REF  40 LAST 596   21,3244  3 7752 0          CAF   BIT10
0444                      21,3245  1 3247 1          TCF   +2
0445  REF  14 LAST 577   21,3246  3 7753 1          CAF   BIT9
0446  REF   1            21,3247  54 066 0          TS    CHNL12

0447  REF   7 LAST 599   21,3250  11'525 0          CCS   NEGJR
0448  REF  24 LAST 595   21,3251  3 7750 1          CAF   BIT12
0449                      21,3252  1 3254 0          TCF   +2
0450  REF  32 LAST 577   21,3253  3 7751 0          CAF   BIT11
0451  REF   2 LAST 599   21,3254  26 066 0          ADS   CHNL12      (STORED RESULT NOT USED AT PRESENT)

04511 REF   1            21,3255  4 3242 1          CS    BGIM
04512                    21,3256  0 0006 1          EXTEND
04513                    21,3257  03 012 1          MASK  12
04514 REF   3 LAST 599   21,3260  3 0066 1          CA    CHNL12
0452                     21,3261  0 0006 1          EXTEND
0453                     21,3262  05 012 1          MOR   12

0454  REF 203 LAST 590   21,3263  0 0002 0          TC    Q           SIMPLE RETURN ALWAYS

R0455  Q=R-TRANSF TRANSFORMS A Y,Z GIMBAL COORDINATE VARIABLE PAIR (IN A,L) TO PILOT COORDINATES (Q/R), RETURNED IN A.
R0457  (THE MATRIX M FROM GIMBAL TO PILOT AXES IS ASSUMED TO BE DONE BY T4RUPT AND SCALED AT +1.)

0459  REF  17 LAST 599                0066  QRERAS   EQUALS ITEMP6
```

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```
0460  REF   1                 21,3264  22 066 1  QTRANSF  LXCH   QREGAS    SAVE Z-AXIS VARIABLE
0461                          21,3265  0 0006 1            EXTEND
0462  REF   4 LAST 533        21,3266  7 1405 0            MP     M21       (Y-AXIS)*M21
0463  REF   2 LAST 600        21,3267  56 066 1            XCH    QREGAS    SAVE, GET Z-AXIS VARIABLE
0464                          21,3270  0 0006 1            EXTEND
0465  REF   6 LAST 533        21,3271  7 1401 1            MP     M22       (Z-AXIS)*M22
0466  REF   3 LAST 600        21,3272  6 0066 1            AD     QREGAS    SUM = (Y-AXIS)*M21 + (Z-AXIS)*M22
0467  REF 204 LAST 599        21,3273  0 0002 0            TC     Q         RETURN WITH SUM IN A

0468  REF   4 LAST 600        21,3274  22 066 1  RTRANSF  LXCH   QREGAS    SAVE Z-AXIS VARIABLE
0469                          21,3275  0 0006 1            EXTEND
0470  REF   4 LAST 533        21,3276  7 1406 0            MP     M31       (Y-AXIS)*M31
0471  REF   5 LAST 600        21,3277  56 066 1            XCH    QREGAS    SAVE, GET Z-AXIS VARIABLE
0472                          21,3300  0 0006 1            EXTEND
0473  REF   5 LAST 533        21,3301  7 1403 0            MP     M32       (Z-AXIS)*M32
0474  REF   6 LAST 600        21,3302  6 0066 1            AD     QREGAS    SUM = (Y-AXIS)*M31 + (Z-AXIS)*M32
0475  REF 205 LAST 600        21,3303  0 0002 0            TC     Q         RETURN WITH SUM IN A

04754                         21,3304  25253 1  .66667    DEC    .66667
04755                         21,3305  26501 1  .707GTS   DEC    0.70711
0476                          21,3306  25253 1  (2/3)     DEC    0.66667
```

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P0478 SUBROUTINE: TGOFFCAL MOD. NO. 1 DATE: AUGUST 22, 1966

R04781 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

R0479 PROGRAM DESIGN BY: RICHARD D. GOSS (MIT/IL)

R0480 PROGRAM IMPLEMENTATION BY: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R04805 MODIFIED 30 NOV 66, TO USE ACCDOTQ AND ACCDOTR. CRAIG WORK
R04806 MODIFIED AUGUST '67 TO CHANGE CALLING SEQUENCE AND MAKE MAXTIME ERASABLE PETER WEISSMAN

R0481 THIS SUBROUTINE CALCULATES THE TRIM GIMBAL SHUTDOWN TIME FOR EITHER THE Q OR THE R AXIS (DEPENDING ON THE
R0483 CALLING SEQUENCE). THIS TIME IS SCALED FOR IMMEDIATE USE BY A WAITLIST CALL AS SHOWN IN THE CALLING SEQUENCES.
R0485 IF THE TIME-TO-GO IS MORE THAN 'DRIVELIM', IT IS LIMITED TO 'MAXTIME'. IF
R0487 THE TIME-TO-GO IS LESS THAN TEN MILLISECONDS, THE SHUTDOWN IS PERFORMED IMMEDIATELY AND THE WAITLIST CALL IS
R0489 BY-PASSED.

R0494 THESE TIME-TO-GO CALCULATIONS ARE DESIGNED TO DRIVE THE TRIM GIMBAL TO A POSITION WHERE THE DESCENT ENGINE WILL
R0496 CAUSE NO ANGULAR ACCELERATION. THIS SUBROUTINE IS CALLED ONLY FROM THE WAITLIST TASK CHEKDRIV WHICH IS
R0498 INITIATED ONLY WHEN THE TRIM GIMBAL CONTROL LAW HAS LOST CONTROL OF THE LEM VEHICLE ATTITUDE AND MUST RETURN TO
R0500 THE USE OF REACTION CONTROL SYSTEM JETS.

R0501 CALLING SEQUENCES:

```
A0502                                   CAF     ZERO        INDEX FOR Q-AXIS.
A0503                                   TC      TGOFFCAL
A0504                                   CAF     NEGMAX      RETURN HERE FOR NO Q DRIVE.
A0505                                   TS      (QTIME)     RETURN HERE WITH TIME IN A (DECASECONDS)

A0506                                   CAF     TWO         INDEX FOR R-AXIS.
A0507                                   TC      TGOFFCAL
A0508                                   CAF     NEGMAX      RETURN HERE FOR NO R DRIVE.
A0509                                   TS      (RTIME)     RETURN HERE WITH TIME IN A (DECASECONDS)
```

R0520 SUBROUTINES CALLED: NONE, BUT WRCHNL12 IS CALLED AFTER BOTH TGOFFCALL CALLS.

R0522 NORMAL EXITS: TO WAITLIST CALL OR BEYOND 2CADR IN CALLING SEQUENCE AS SPECIFIED ABOVE.

R0524 ALARM OR ABORT EXIT MODES: NONE

R0525 INPUT: 1. THE AXIS INDEXER: 0 FOR Q, 2 FOR R (SEE CALLING SEQUENCES)
R0526 2. THE SIGNED TIME DERIVATIVE OF ACCELERATION (QACCDOT OR RACCDOT) SCALED AT pi/2(7) RAD/SEC(3).
R0528 3. THE ACCELERATION APPROXIMATION FROM THE DESCENT KALMAN FILTER TRANSFORMED TO PILOT AXES (ALPHAQ OR
R0530 ALPHAR) SCALED AT PI/8 RAD/SEC(2).

R0531 4. CHANNEL 12 CONTAINS THE GIMBAL DRIVES AND OTHER BITS.
R0532 OUTPUT 5. THE NEGATIVE GIMBAL DRIVE FLAG (NEGQD AND NEGQR) WHERE A +1 BIT REQUESTS POSITIVE GIMBAL DRIVE
R0534 (ANGULAR ACCELERATION DECREASING), A -1 BIT REQUESTS NEGATIVE GIMBAL DRIVE (ANG. ACC. INCREASING).
R05355 A ZERO INDICATES NO DRIVE.
R0536 6. TIME REQUIRED TO ZERO OFFSET, SCALED FOR Q(R)GIMTIMR.

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R0537 ERASABLE STORAGE CONFIGURATION (NEEDED BY THE INDEXING METHODS):

```
A0538                                   NEGUQ    ERASE   +2          NEGATIVE OF Q-AXIS GIMBAL DRIVE
A0539                                   (SPWORD) EQUALS  NEGJQ +1    ANY S.P. ERASABLE NUMBER, NOW THRSTCMD
A0540                                   NEGUR    EQUALS  NEGJQ +2    NEGATIVE OF R-AXIS GIMBAL DRIVE

A0541                                   ACCDOTQ  ERASE   +2          Q-JERK TERM SCALED AT PI/2(7) RAD/SEC(3)
A0542                                   (SPWORD) EQUALS  ACCDOTQ +1  ANY S.P. ERASABLE NUMBER  NOW DACCDOT
A0543                                   ACCDOTR  EQUALS  ACCDOTQ +2  R-JERK TERM SCALED AT PI/2(7) RAD/SEC(3)
A0544                                                                ACCDOTQ,ACCDOTR ARE MAGNITUDES.
A0545                                   ALPHAQ   ERASE   +2          Q-AXIS ACCELERATION SCALED AT PI/8 R/S2
A0546                                   (SPWORD) EQUALS  ALPHAQ +1   ANY S.P. ERASABLE NUMBER, NOW OMEGAR
A0547                                   ALPHAR   EQUALS  ALPHAQ +2   R-AXIS ACCELERATION SCALED AT PI/8 R/S2
A0548                                                                NOTE: NOW OMEGAP,OMEGAQ PRECEDE ALPHAQ
```

R0549 DEBRIS: L, Q, ITEMP1, ITEMP2, ITEMP6

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 0550  REF   1                 21,3307  54 061 1  TGOFFCAL TS      ORNDXER     Q OR R AXIS INDEXER
 0551  REF   2 LAST 602        21,3310  50 061 0           INDEX   ORNDXER     GET JERK TERM MAGNITUDE SCALED AT
 0552  REF   5 LAST 598        21,3311  31'532 1           CAE     ACCDOTQ       PI/2(7) IN RADIANS/SEC(3).
 0553                          21,3312  0 0006 1           EXTEND               UNLESS THETA TRIPLE-DOT MAGNITUDE IS NON
 0554  REF   1                 21,3313  6 3373 0           BZMF    TGOFFNOW       -ZERO, SET DRIVE TO ZERO NOW.
 0555  REF   1                 21,3314  54 062 1           TS      NZACCDOT    SAVE NON-ZERO DENOMINATOR.
 05551 REF   3 LAST 602        21,3315  50 061 0           INDEX   ORNDXER     INITIALIZE THE AOSTERM WHICH WILL BE UP-
 05552 REF   5 LAST 592        21,3316  31'417 1           CAE     ALPHAQ      DATED IN THE DUMMYFIL CALCULATION FOR
 05553                         21,3317  0 0006 1           EXTEND               USE IN THE QRAXIS RATE DERIVATION.  SET
 05554 REF   1                 21,3320  7 3403 1           MP      .1=.05K)    AOSTERM TO ALPHA*CSP*(1-.5*K), WHERE CSP
 05555 REF 131 LAST 592        21,3321  56 001 0           XCH     L           IS .1 SEC, K IS .5   THEN AOSTERM IS SET
 05556 REF   4 LAST 602        21,3322  10 061 1           CCS     ORNDXER     TO .075*ALPHA, SCALED AT PI/4, WHILE
 05557 REF 270 LAST 598        21,3323  50 000 1           INDEX   A           ALPHA IS SCALED AT PI/8( THE CONSTANT IS
 05558 REF   8 LAST 594        21,3324  23'664 1           LXCH    AOSQTERM    SCALED AT 2.
 0556  REF   5 LAST 602        21,3325  50 061 0           INDEX   ORNDXER     GET ACCELERATION SCALED AT PI/8
 0557  REF   6 LAST 602        21,3326  31'417 1           CAE     ALPHAQ        RAD/SEC(2).
 0558                          21,3327  0 0006 1           EXTEND               IF ACCELERATION IS ALREADY ZERO, EXIT.
 0559  REF   2 LAST 602        21,3330  1 3373 1           BZF     TGOFFNOW    OTHERWISE, PROCEED WITH NON-ZERO ALPHA,
 0560                          21,3331  0 0006 1           EXTEND               SET NEGUQ TO THE SIGN OF ALPHA, THEN USE
 0561  REF   1                 21,3332  6 3336 1           BZMF    NEGALPH       THE MAGNITUDE OF ALPHA TO COMPUTE TIME
 0562  REF  18 LAST 599        21,3333  54 066 0           TS      ITEMP6
 0563  REF  44 LAST 598        21,3334  3 7763 1           CAF     BIT1
 0564                          21,3335  1 3341 0           TCF      +4
 0565  REF 271 LAST 602        21,3336  4 0000 0  NEGALPH  CS      A
 0566  REF  19 LAST 602        21,3337  54 066 0           TS      ITEMP6
 0567  REF  45 LAST 602        21,3340  4 7763 0           CS      BIT1
 0568  REF   6 LAST 602        21,3341  50 061 0           INDEX   ORNDXER     STORE THE DRIVE DIRECTION FLAG
 0569  REF   9 LAST 599        21,3342  55'523 0           TS      NEGJQ       TIME = MAGNITUDE OF (ALPHA/ACCDOT),
A05691                                                                        MINUS THE SIGN OF Q(R)ACCDOT LEFT IN A.
 05692                         21,3343  0 0006 1           EXTEND               STORE ACCDOT TO REFLECT THE CHANGE IN
 05693 REF   7 LAST 602        21,3344  5 0061 0           INDEX   ORNDXER     GIMBAL DRIVE DIRECTION (POSSIBLE).  THIS
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05694  REF   6 LAST 602     21,3345  7 1532 0          MP      ACCDOTQ      CAN BE ESSENTIAL FOR DUMMYFIL, IN CASE
05695  REF   8 LAST 602     21,3346  50 061 0          INDEX   QRNDXER      Q(R)ACCDOT IS NOT INITIALIZED BEFORE
05696  REF   7 LAST 598     21,3347  23'533 0          XCH     QACCDOT      EXECUTING DUMMYFIL.
05705  REF   2 LAST 602     21,3350  30 062 0          CAE     NZACCDOT     WILL ALPHA/ACCDOT EXCEED MAX DRIVE TIME?
0571                        21,3351  0 0006 1          EXTEND
0572   REF   1             21,3352  7 1747 0          MP      DRIVELIM     MAX DRIVE TIME AT 16 SEC (ERASABLE LOAD)
0573                        21,3353  0 0006 1          EXTEND
0574   REF  20 LAST 602     21,3354  60 066 1          SU      ITEMP6       15*ACCDOT - ABS(ALPHA) AT PI/8
0575                        21,3355  0 0006 1          EXTEND
0576   REF   1             21,3356  6 3370 0          BZMF    USEMAX       LARGE T.  USE MAX DRIVE TIME INSTEAD.

0577   REF  21 LAST 603     21,3357  30 066 1          CAE     ITEMP6       DRIVE  IME = ABS(ALPHA/ACCDOT)
0578                        21,3360  0 0006 1          EXTEND               RESCALE QUOTIENT TO TIMER(ERASABLE LOAD)
0579   REF   9 LAST 603     21,3361  5 0061 0          INDEX   QRNDXER
05795  REF   2 LAST  56     21,3362  7 1750 0          MP      DRIVFACQ     (10 SCALED AT 2(10)) X (DAMPING FACTOR)
0580                        21,3363  0 0006 1          EXTEND
0581   REF   3 LAST 603     21,3364  10 062 1          DV      NZACCDOT

0582                        21,3365  0 0006 1 ZEROTEST EXTEND               BE SURE WAITLIST TIME IS GREATER THAN 0.
0583   REF   3 LAST 602     21,3366  6 3373 0          BZMF    TGOFFNOW

0584                        21,3367  1 3371 0          TCF     +2           IT IS, RETURN.

0585   REF   1             21,3370  31'755 1 USEMAX   CAE     MAXTIME      USE MAXIMUM DRIVE TIME.
0586   REF 206 LAST 600     21,3371  50 002 0  +2      INDEX   Q            RETURN TO Q+1 WITH TIME IN A.
0588                        21,3372  0 0001 0          TC      1

0589   REF 201 LAST 599     21,3373  3 7767 0 TGOFFNOW CAF     ZERO         MAKE SURE PLUS ZERO FOR DRIVE FLAG
0590   REF  10 LAST 603     21,3374  50 061 0          INDEX   QRNDXER      TURN OFF DRIVE FLAG NOW
0591   REF  10 LAST 602     21,3375  55'523 0          TS      NEGJQ
0592   REF 207 LAST 603     21,3376  0 0002 0          TC      Q            RETURN TO Q ( WITHOUT A DRIVE TIME).

0593   REF  35 LAST 594     21,3377  0 4736 1          TC      CCSHOLE        (FILLER)

R05931 **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

0594   REF  73 LAST 588                   0061  QRNDXER  EQUALS  ITEM01      INDEXER FOR Q OR R AXIS
0595   REF  36 LAST 587                   0062  NZACCDOT EQUALS  ITEM02      TEMPORARY STORAGE FOR NON-ZERO ACCDOT
0596                        21,3400   50437 1  -2MINWL  DEC     -12000       - 2 MINUTES SCALED FOR WAITLIST
0597                        21,3401   60777 0  -2MIN256 DEC     -.46875      - 2 MINUTES SCALED AT 256
0598                        21,3402   31000 0  128/164  OCTAL   31000        128/163.84 CONVERTING 256 TO WAITLIST/2
0599                        21,3403   01146 0  .1-.05() OCTAL   01146        .0375=.075 SCALED AT 2
R4000  START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

4001   REF   4 LAST 522     21,3404  11'764 1 TESTCNTR CCS     SIMPCNTR     USE BIGBOX FOR PASSCTR INITIALIZATION
4002   REF   1             21,3405  1 3410 0          TCF     BIGLOAD      UNTIL SIMPCNTR IS +0. THEN USE COUNTBOX.

4003   REF   1             21,3406  31'743 0          CAE     COUNTBOX
4004   REF   1             21,3407  1 3612 0          TCF     LOADCNTR
```

L TRIM GIMBAL CONTROL SYSTEM USER'S OWN PAGE NO. 14 S3 E6

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4005  REF   1             21,3410  31'766 1  BIGLOAD  CAE    BIGBOX
4006  REF   2 LAST 603    21,3411  1 3612 0          TCF    LOADCNTR

R4007 **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967**********

R4008 THE NEXT FIVE CELLS ARE LEFT IN FOR SPACING.

4022  REF   5 LAST 598    21,3412  27'522 1          ADS    FUNCTION +1   MULTIPLIER AS C(A). MULTIPLY THESE AND
4023  REF 132 LAST 602    21,3413  54 001 1          TS     L             USE ONLY HIGH ORDER PART OF PRODUCT.
4024                      21,3414  1 3416 0          TCF     +2           ADD S.P. LOW PRODUCT TO LOW PART OF HIGH
4025  REF   6 LAST 604    21,3415  27'521 1          ADS    FUNCTION      PRODUCT. CHECK OVERFLOW, CARRY, AND
4026  REF 208 LAST 603    21,3416  0 0002 0          TC     Q             RETURN.
```

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R0001   PROGRAM NAME: AOSTASK          MOD. NO. 1  DATE: NOVEMBER 20, 1966

R0002   AUTHOR: JONATHAN D. ADELSTON (ADAMS ASSOCIATES)

R0003   THIS "WAITLIST TASK" IS EXECUTED EVERY 2 SECONDS DURING ASCENT (APS) BURNS.  IT ESTIMATES THE ACCELERATION DUE
R0005   TO THE ENGINE OFF-SET.  TO USE THESE ESTIMATES, IT ALSO CALCULATES TERMS TO ADD INTO THE LM DAP RATE DERIVATION
R0007   AND WEIGHTING FACTORS FOR THE ESTIMATE OF AOS AND FOR THE RATE DERIVATION.  FINALLY, IT ALSO SETS UP "AOSJOB"
R0009   THROUGH THE EXECUTIVE TO CALCULATE FUNCTIONS OF THE AOS.

R0010   CALLING SEQUENCE:

A0011                                       L -1      CAF     2SECSDAP
A0012                                       L         TC      WAITLIST
A0013                                                 EBANK=  AOSQ
A0014                                       L +1, +2  2CADR   AOSTASK
A0015                                       L +3      (RETURN)

R0016   NORMAL EXIT MODE: "TASKOVER"    ALARM/ABORT MODE: NONE.

R0017   INPUT  APSGOING/DAPBOOLS
R0018          AOSQ,AOSR
R0019          COEFCTR
R0020          OLDWFORQ,OLDWFORR
R0021          SUMRATEQ,SUMRATER
R0022          OMEGAQ,OMEGAR

R0023   OUTPUT AOSQ,AOSR,AOSJ,AOSV
R0024          AOSQTERM,AOSRTERM
R0025          SUMRATEQ,SUMRATER
R0026          KCOEFCTR

R0027   DEBRIS: A,L,ITEMP1,ITEMP2.

R0028   THE FOLLOWING LM DAP ERASABLES ARE ZEROED IN THE STARTDAP SECTION OF THE DAPIDLER PROGRAM AND THE COASTASC
R0030   SECTION OF THE AOSTASK.  THE ORDER MUST BE PRESERVED FOR THE INDEXING METHODS WHICH ARE EMPLOYED IN THOSE
R0032   SECTIONS AND ELSEWHERE.

A0033                                       AOSQ      ERASE   +3            ASCENT OFFSET ACCELERATION ESTIMATES:
A0034                                       AOSR      EQUALS  AOSQ +1       ESTIMATED EVERY 2 SECONDS BY AOSTASK.
A0035                                       AOSU      EQUALS  AOSQ +2       U,V-AXES ACCS FORMED BY VECTOR ADDITION.
A0036                                       AOSV      EQUALS  AOSQ +3       SCALED AT PI/2 RADIANS/SECOND(2).

A0037                                       AOSQTERM  ERASE   +1            (.1-.05K)AOS
A0038                                       AOSRTERM  EQUALS  AOSQTERM +1   SCALED AT PI/4 RADIANS/SECOND.

A0039                                       NJ+Q      ERASE   +7            2 JET OVER-RIDE FLAGS:
A0040                                       NJ-Q      EQUALS  NJ+Q +1       WHENEVER THE OFFSET ACCELERATION ABOUT
A0041                                       NJ+R      EQUALS  NJ+Q +2       AN AXIS IS SO HIGH THAT 2 JETS WOULD NOT
A0042                                       NJ-R      EQUALS  NJ+Q +3       CONTROL ATTITUDE SUCCESSFULLY, THEN NJ
A0043                                       NJ+U      EQUALS  NJ+Q +4       FOR THAT AXIS (IN THE DIRECTION OPPOSING
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L AOSTASK AND AOSJOB USER'S OWN PAGE NO. 2 S3

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A0044                   NJ-U    EQUALS NJ+3 +5      AOS) IS SET TO 1.  OTHERWISE, THE VALUE
A0045                   NJ+V    EQUALS NJ+3 +6      IS ZERO.  THESE FLAGS PREVENT TWO JETS
A0046                   NJ-V    EQUALS NJ+3 +7      FROM BEING REQUESTED TO FIGHT THE AOS.
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L AOSTASK AND AOSJOB USER'S OWN PAGE NO. 3 53

P0047 AOSTASK IS EXECUTED ONLY DURING POWERED ASCENT. IF NO LONGER IN POWERED ASCENT, STOP THE CYCLING OF AOSTASK AND
R0049 SET JO VARIABLES FOR COASTING ASCENT.

```
0050                                20,3245          BANK   20
0051  REF   7 LAST 539                E6             EBANK= AOSQ

R0052 KEEP TRACK OF LENGTH OF BURN FOR DETERMINATION OF WEIGHTING FACTOR K:

0053  REF   5 LAST 517   20,3245  31'650 0  AOSTASK  CAE    <COEFCTR        TEST KCOEFCTR FOR INITIAL PASS
0054                     20,3246  0 0006 1           EXTEND
0055  REF   1           20,3247  1 3376 1           BZF    ZEROCOEF        GO TO DISCONTINUITY SECTION FOR COEFFA.

0056  REF   1           20,3250  6 3427 0           AD     DEC-399         TEST KCOEFCTR FOR CONSTANT RANGE WHICH
0057                     20,3251  0 0006 1           EXTEND                 OCCURS WHEN DURATION OF BURN IS EQUAL TO
0058                     20,3252  6 3254 1           BZMF   +2              OR GREATER THAN 400 SECONDS. (SINCE
0059  REF   1           20,3253  1 3402 0           TCF    <ONENOW         KCOEFCTR IS EVEN, 399 IS THE BREAK PT.)

R0060 FORM WEIGHTING FACTOR FOR ASCENT OFFSET ACCELERATION FILTER:  COEFFA = 0.00125(T) + 0.25

0062  REF   1           20,3254  3 3416 1           CAF    0.00125         COEFFA = 0.00125(T) + 0.25
0063                     20,3255  0 0006 1           EXTEND
0064  REF   6 LAST 607  20,3256  7 1650 1           MP     <COEFCTR        KCOEFCTR = T SCALED AT 2(+14)
0065  REF  22 LAST 596  20,3257  3 7747 1           CAF    BIT13           (BIT13 = 1/4 = 0.25 SCALED AT 1.)
0066  REF 133 LAST 604  20,3260  6 0001 0           AD     L
0067  REF   1           20,3261  54 062 1 COEFFAST  TS     COEFFA          (VOLATILE STORAGE.)

R0068 FORM WEIGHTING FACTOR FOR RATE DERIVATION: K = 0.0014(T) + 0.44

0069  REF   1           20,3262  3 3417 0           CAF    0.0014          K = 0.0014(T) + 0.44
0070                     20,3263  0 0006 1           EXTEND
0071  REF   7 LAST 607  20,3264  7 1650 1           MP     <COEFCTR        KCOEFCTR = T SCALED AT 2(+14)
0072  REF   1           20,3265  3 3424 0           CAF    0.44
0073  REF 134 LAST 607  20,3266  6 0001 0           AD     L
0074  REF   1           20,3267  54 061 1           TS     <               (VOLATILE STORAGE.)
0075                     20,3270  4 0000 0           COM
0076  REF  35 LAST 557  20,3271  6 7743 0           AD     POSMAX          (1 BIT ERROR DOES DOES NOT COMPOUND.)
0077  REF   8 LAST 520  20,3272  55'642 1           TS     (1-K)           (1-K) SCALED AT 1.

0078                     20,3273  0 0006 1           EXTEND
0079  REF  25 LAST 599  20,3274  7 7750 0           MP     BIT12
0080  REF   4 LAST 588  20,3275  55'643 0           TS     (1-K)/8         (1-K)/8 IS (1-K) SCALED AT 8.

0081  REF   2 LAST 607  20,3276  30 061 0           CAE    <               WFORP = WFOROR = K/DT = K/.1 = 10K
0082                     20,3277  0 0006 1           EXTEND                 SCALED AT 16/SECOND.
0083  REF   1           20,3300  7 3425 0           MP     0.625           (CHANGES SCALE FACTOR FROM 1 TO 16/SEC.)
0084  REF   7 LAST 494  20,3301  55'640 0           TS     WFORP           WFORP IS IDENTICAL WFOROR EXCEPT FOR THE
0085  REF   6 LAST 588  20,3302  55'641 1           TS     WFOROR          INITIALIZATION IN STARTDAP OF DAPIDLER.

0086  REF   3 LAST 607  20,3303  4 0061 1           CS     <               FORM (.1-.05K) FROM K SCALED AT 1 FOR
0087                     20,3304  0 0006 1           EXTEND                 THE TORQUE VECTOR RECONSTRUCTION AND
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0088  REF  1              20,3305  7 3421 1          MP      0.05          ALSO FORM (.1-.05K) SCALED AT 1/2 FOR
0089  REF  1              20,3306  6 3422 0          AD      0.1           THE OFFSET ACCELERATION TERM IN THE RATE
0090                      20,3307  6 0000 1          DOUBLE                EBANK6 FOR USE IN T5RUPT WHILE THE
0091  REF  1              20,3310  54 061 1          TS      .1-.05K       LATTER IS VOLATILE AND USED IN THIS TASK

R0092 BEGIN ESTIMATE OF OFFSET ACCELERATION FOR Q,R-AXES:

0093  REF  2 LAST 607     20,3311  30 062 0  COEFFA1  CAE     COEFFA        FORM COEFFA(AOSQ):
0094                      20,3312  0 0006 1          EXTEND
0095  REF  8 LAST 607     20,3313  7 1660 1          MP      AOSQ          FIRST TERM OF NEW AOSQ ESTIMATE:
0096  REF  9 LAST 608     20,3314  55'660 1          TS      AOSQ          SCALED AT PI/2 RADIANS/SECOND(2).

0097  REF  3 LAST 608     20,3315  30 062 0          CAE     COEFFA        FORM COEFFA(AOSR):
0098                      20,3316  0 0006 1          EXTEND
0099  REF  2 LAST 539     20,3317  7 1661 0          MP      AOSR          FIRST TERM OF NEW AOSR ESTIMATE:
0100  REF  3 LAST 608     20,3320  55'661 0          TS      AOSR          SCALED AT PI/2 RADIANS/SECOMD(2).

0101  REF  4 LAST 608     20,3321  4 0062 1          CS      COEFFA        FORM .5(1-COEFFA) SCALED AT 2 FROM THE
0102                      20,3322  0 0006 1          EXTEND                COEFFA SCALED AT 1.  COEFFA IS NOW THE
0103  REF  23 LAST 607    20,3323  7 7747 0          MP      BIT13         SAME AS 2(COEFFA) SCALED AT 2, SO MUST
0104  REF  24 LAST 608    20,3324  6 7747 1          AD      BIT13         MULTIPLY BY 1/4 TO GET .5(COEFFA).  THEN,
0105  REF  1              20,3325  54 062 1          TS      .5-.5COF      ADD 1/4 AS 1/2 SCALED AT 2 FOR RESULT.

R0106 FINISH OFFSET ACCELERATION ESTIMATES:

R0107 AOS  = COEFFA (AOS    ) + .5(1-COEFFA )(OMEGA -OMEGA    -SUMRATE )
R0108   T         T     T-2                 T       T      T-2        T

0109  REF  14 LAST 595    20,3326  4 1416 1          CS      OMEGAQ        SAVE PRESENT -OMEGAQ FOR NEXT PASS AND
0110  REF  3 LAST 517     20,3327  57'626 1          XCH     OLDWFORQ      PICK UP -(LAST OMEGAQ) FROM OLDWFORQ.
0111                      20,3330  0 0006 1          EXTEND
0112  REF  5 LAST 588     20,3331  61'624 0          SU      SUMRATEQ      FORM: W - OLDW - SUMRATE = SUM (Q-AXIS).
0113  REF  15 LAST 608    20,3332  6 1416 0          AD      OMEGAQ        SCALED AT PI/4 RADIANS/SECOND.
0114                      20,3333  0 0006 1          EXTEND
0115  REF  2 LAST 608     20,3334  7 0062 1          MP      .5-.5COF      AOSQ = COEFFA(AOSQ)+.5(1-COEFFA)(SUMQ)
0116  REF  10 LAST 608    20,3335  27'660 1          ADS     AOSQ          SCALED AT PI/2 RADIANS/SECOND(2).

0117  REF  14 LAST 592    20,3336  4 1420 1          CS      OMEGAR        SAVE PRESENT -OMEGAR FOR NEXT PASS AND
0118  REF  2 LAST 517     20,3337  57'627 0          XCH     OLDWFORR      PICK UP -(LAST OMEGAR) FROM OLDWFORR.
0119                      20,3340  0 0006 1          EXTEND
0120  REF  4 LAST 588     20,3341  61'625 1          SU      SUMRATER      FORM: W - OLDW - SUMRATE = SUM (R-AXIS).
0121  REF  15 LAST 608    20,3342  6 1420 0          AD      OMEGAR        SCALED AT PI/4 RADIANS/SECOND.
0122                      20,3343  0 0006 1          EXTEND
0123  REF  3 LAST 608     20,3344  7 0062 1          MP      .5-.5COF      AOSR = COEFFA(AOSR)+.5(1-COEFFA)(SUMR)
0124  REF  4 LAST 608     20,3345  27'661 0          ADS     AOSR          SCALED AT PI/2 RADIANS/SECOND(2).

R0125 CALCULATE THE OFFSET ACCELERATIONS FOR THE U,V-AXES:

0126  REF  11 LAST 608    20,3346  31'660 0          CAE     AOSQ          FIRST, CALCULATE AOSU:
0127  REF  5 LAST 608     20,3347  6 1661 1          AD      AOSR
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0128                          20,3350  0 0006 1          EXTEND
0129  REF   1                 20,3351  7 3426 0          MP      0.70711
0130  REF   1                 20,3352  55'662 0          TS      AOSJ        SCALED AT PI/2 RADIANS/SECOND(2).

0131  REF  12 LAST 608        20,3353  4 1660 1          CS      AOSQ        THEN, CALCULATE AOSV:
0132  REF   6 LAST 608        20,3354  6 1661 1          AD      AOSR
0133                          20,3355  0 0006 1          EXTEND
0134  REF   2 LAST 609        20,3356  7 3426 0          MP      0.70711
0135  REF   1                 20,3357  55'663 1          TS      AOSV        SCALED AT PI/2 RADIANS/SECOND(2).

R0136 FORM TERMS FOR RATE DERIVATION:

0137  REF   2 LAST 608        20,3360  30 061 0          CAE     .1=.05K     FORM Q-AXIS RATE DERIVATION TERM:
0138                          20,3361  0 0006 1          EXTEND
0139  REF  13 LAST 609        20,3362  7 1660 1          MP      AOSQ        AOSQTERM = (.1=.05K)AOSQ
0140  REF   9 LAST 602        20,3363  55'664 0          TS      AOSQTERM    SCALED AT PI/4 RADIANS/SECOND.

0141  REF   3 LAST 609        20,3364  30 061 0          CAE     .1=.05K     FORM R-AXIS RATE DERIVATION TERM:
0142                          20,3365  0 0006 1          EXTEND
0143  REF   7 LAST 609        20,3366  7 1661 0          MP      AOSR        AOSRTERM = (.1=.05K)AOSR
0144  REF   3 LAST 520        20,3367  55'665 1          TS      AOSRTERM    SCALED AT PI/4 RADIANS/SECOND.

R0145 SET ERASABLES FOR NEXT 2 SECOND INTERVAL:

0146  REF  78 LAST 595        20,3370  3 7762 0          CAF     TWO         INCREMENT BURN DURATION TIMER BY 2 SECS.
0147  REF   8 LAST 607        20,3371  27'650 1          ADS     KCOEFCTR

0148                          20,3372  0 0006 1          EXTEND              SET UP SUMRATES
0149  REF   4 LAST 588        20,3373  4 1623 0          DCS     SAVRATEQ
0150  REF   6 LAST 608        20,3374  53'625 0          DXCH    SUMRATEQ

0151  REF   7 LAST 517        20,3375  1 5735 1          TCF     NOQRSM
R0152 SPECIAL DISCONTINUITY SECTION FOR COEFFA ON FIRST PASS:

0153  REF  79 LAST 609        20,3376  3 7762 0  ZEROCOEF CAF     TWO         INITIALIZE BURN DURATION TIMER TO TWO
0154  REF   9 LAST 609        20,3377  55'650 1          TS      KCOEFCTR    SECONDS FOR THE DERIVATION OF K.

0155  REF 202 LAST 603        20,3400  3 7767 0          CAF     ZERO        FOR THE FIRST PASS, SET COEFFA TO ZERO
0156  REF   1                 20,3401  1 3261 0          TCF     COEFFAST    SINCE AOS ESTIMATES ARE NOW USELESS.

R0157 SPECIAL K AND COEFFA SETTINGS FOR BURNS LASTING 400 SECONDS OR MORE:

0158                          20,3402  0 0006 1  KONENOW  EXTEND              K=1, SO 1-K AT EITHER SCALING IS ZERO.
0159  REF   1                 20,3403  3 3431 1          DCA     DPZEROX     (1-K)   SCALED AT 1.
0160  REF   9 LAST 607        20,3404  53'643 0          DXCH    (1-K)       (1-K)/8 SCALED AT 8.

0161  REF   2 LAST 607        20,3405  3 3425 1          CAF     0.625       WFORP = WFORQR = K/DT = K/.1 = 10K = 10
0162  REF   8 LAST 607        20,3406  55'640 0          TS      WFORP       SCALED AT 16/SECOND.
0163  REF   7 LAST 607        20,3407  55'641 1          TS      WFORQR
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0164  REF   2 LAST 608    20,3410  3 3422 0          CAF    0.1          (.1=.05K) = 0.05 SINCE K = 1.
0166  REF   4 LAST 609    20,3411  54 061 1          TS     .1=.05K      SCALED AT 1/2. (VOLATILE STORAGE.)

0167  REF   4 LAST 487    20,3412  3 5210 1          CAF    BIT13=14     COEFFA = 0.75
0168  REF   5 LAST 608    20,3413  54 062 1          TS     COEFFA       SCALED AT 1.   (VOLATILE STORAGE.)

0169  REF   1              20,3414  1 3311 0          TCF    COEFFA1      GO BEGIN OFFSET ACCELERATION ESTIMATE.

R0170 CONSTANTS FOR AOSTASK:

01705                      20,3415  00000 1           OCT    0            TO PRESERVE LOCATION OF 1/ACCS.
0171                       20,3416  00024 1  0.00125  DEC    0.00125
0172                       20,3417  00027 1  0.0014   DEC    0.0014
0173                       20,3420  00111 0  0.00444  DEC    0.00444
0174                       20,3421  01463 1  0.05     DEC    0.05
0175                       20,3422  03146 1  0.1      DEC    0.1
0176                       20,3423  12000 1  0.3125   DEC    0.3125
0177                       20,3424  16051 1  0.44     DEC    0.44
0178                       20,3425  24000 1  0.625    DEC    0.625
0179                       20,3426  26501 1  0.70711  DEC    0.70711
0180                       20,3427  77160 0  DEC-399  DEC    -399
0181                       20,3430  00000 1  D=ZEROX  2DEC   0
C0181                      20,3431  00000 1
0182                       20,3432  00310 0  2SECSDAP DEC    200
0183                       20,3433  20000 0  (1-K)S    DEC    0.5
0184                       20,3434  02000 0           DEC    0.0625
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P0185   PROGRAM NAME: WCHANGER          MOD. NO. 0  DATE: DECEMBER 9, 1966

R0186   THIS PROGRAM IS A WAITLIST TASK WHICH IS INITIATED FROM THE STARTDAP SECTION OF DAPIDLER.  IT IS EXECUTED
R0188   BETWEEN THE FIRST Q,R-AXES T5RUPT AND THE SECOND P-AXIS T5RUPT (I.E. 180 MS AFTER STARTDAP).  THE PURPOSE OF
R0190   WCHANGER IS TO RESET THE VARIABLE K (IN ALL ITS FORMS) FOR THE RATE DERIVATION FROM 1 TO 0.5.  (IT ALSO SETS THE
R0192   NOMINAL LM DAP DT TO 100 MS.)

R0193   CALLING SEQUENCE (FROM STARTDAP):

A0194                                   L -1    CAF     180MS
A0195                                   L       TC      WAITLIST
A0196                                           EBANK=  WFORQR
A0197                                   L +1    2CADR   WCHANGER
A0198                                   L +2    (BBCON)
A0199                                   L +3    (RETURN)

R0200   SUBROUTINES CALLED: WCHANGE.    NORMAL EXIT: TASKOVER.

R0201   INPUT: NONE.                    ALARM/ABORT EXITS: NONE.

R0202   OUTPUT: WFORP,WFORQR,(1-K),(1-K)/8.

 0203   REF  22 LAST 589    20,3435  0 5270 1  WCHANGER TC     IBNKCALL        (WAITLIST TASK IS IN T3RUPT.)
 0204   REF   1             20,3436  40162 0           FCADR  WCHANGE         SUBROUTINE DOES SETTING TO SAVE SPACE.
R0205   WE RETURN FROM WCHANGE WITH RANDOM EBANK, BUT WHO CARES.
 0206   REF  58 LAST 599    20,3437  1 5727 1          TCF    TASKOVER        END THIS TASK.
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R0207   INERPOLY COMPUTES IXX, IYY, IZZ, AND IN DESCENT, -.PVT-CG, ACCDOTQ, ACCDOTR,KQ,KQ2, KRDAP, KR2..
R0209   AFTER THE INERTIAS ARE COMPUTED, THEY ARE USED TO COMPUTE NEW VALUES OF
R0210   1JACC, 1JACCQ, 1JACCR, 1JACCU, 1JACCV AND 1/2JTSP.
R0211   INERPOLY EXITS BY .... TCF ENDOFJOB


0212                                    26,2713         BANK    26
0213    REF   1                           E6            EBANK=  IXX
0214    REF  25 LAST 522        26,2713  3 7762 0 1/ACCS CA      BIT2
0215                            26,2714  0 0006 1        EXTEND
0216                            26,2715  02 030 0        RAND    30
0217    REF 272 LAST 602        26,2716  10 000 0        CCS     A       CHOOSES ASCENT OR DESCENT COEF
0218    REF  28 LAST 575        26,2717  4 6311 0        CS      THREE
0219    REF  16 LAST 542        26,2720  6 6306 1        AD      SIX
0220    REF   1                 26,2721  55,621 1        TS      INERCTRX

0221    REF  30 LAST 609        26,2722  3 7762 0        CAF     TWO
0222    REF   1                 26,2723  55,620 0 STCTR  TS      INERCTR         J=2,1,0 FOR IZZ,IYY,IXX

0223                            26,2724  0 0006 1        EXTEND
0224    REF   2 LAST 612        26,2725  27,621 1        DIM     INERCTRX        JX=5,4,3 OR 2,1,0 FOR Z,Y,X COEF

0225    REF   2 LAST 336        26,2726  3 1320 1 STCTR1 CA      MASS            IN KGS (+15)
0226                            26,2727  0 0006 1        EXTEND
0227    REF   3 LAST 612        26,2730  5 1621 0        INDEX   INERCTRX
0228    REF   1                 26,2731  7 3136 1        MP      INERCONC
0229    REF   4 LAST 612        26,2732  51,621 0        INDEX   INERCTRX
0230    REF   1                 26,2733  6 3145 1        AD      INERCONB
0231                            26,2734  0 0006 1        EXTEND
0232    REF   3 LAST 612        26,2735  7 1320 0        MP      MASS
0233    REF   5 LAST 612        26,2736  51,621 0        INDEX   INERCTRX
0234    REF   1                 26,2737  6 3154 1        AD      INERCONA
0235    REF   2 LAST 612        26,2740  51,620 1        INDEX   INERCTR
0236    REF   2 LAST 612        26,2741  55,452 1        TS      IXX             I(J)=(C(JX)MASS+B(JX))MASS+A(JX)   (+18)
A0237                                                                            I(-1)=L,PVT-CG  (+6)

0238    REF   3 LAST 612        26,2742  11,620 0        CCS     INERCTR         COUNTER 2,1,0,-1
0239    REF   1                 26,2743  1 2723 1        TCF     STCTR
0240    REF   1                 26,2744  1 2746 1        TCF     COMMEQS
0241    REF   1                 26,2745  1 3014 0        TCF     LRESC

0242                            26,2746  0 0006 1 COMMEQS EXTEND
0243    REF   1                 26,2747  3 3163 0        DCA     TORQJET         500 FT-LBS. (+16) PI
0244                            26,2750  0 0006 1        EXTEND
0245    REF   3 LAST 612        26,2751  11,452 1        DV      IXX
0246    REF   6 LAST 493        26,2752  55,613 0        TS      1JACC           SCALED BY PI/4

0247                            26,2753  0 0006 1        EXTEND
0248    REF   1                 26,2754  3 3165 0        DCA     TORQJET1        550 FT-LBS. (+16) PI
```

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```
0249                          26,2755  0 0006 1          EXTEND
0250   REF   1                26,2756  11'453 0          DV      IYY
0251   REF   2 LAST 587       26,2757  55'614 1          TS      1JACCQ          SCALED BY PI/4

0252                          26,2760  0 0006 1          EXTEND
0253   REF   2 LAST 612       26,2761  3 3165 0          DCA     TORKJET1        550 FT-LBS. (+16) PI
0254                          26,2762  0 0006 1          EXTEND
0255   REF   1                26,2763  11'454 1          DV      IZZ
0256   REF   2 LAST 587       26,2764  55'615 0          TS      1JACCR          SCALED BY PI/4

0257   REF   3 LAST 613       26,2765  6 1614 0          AD      1JACCQ
0258                          26,2766  0 0006 1          EXTEND
0259   REF   1                26,2767  7 3170 0          MP      0.35356         .70711 SCALED BY (+1)
0260   REF   1                26,2770  55'616 0          TS      1JACCU
0261   REF   1                26,2771  55'617 1          TS      1JACCV          SCALED BY PI/4

0262   REF   1                26,2772  3 3166 0          CAF     4JTORK
0263   REF   1                26,2773  55'451 1          TS      TEMPINER
0264   REF   4 LAST 612       26,2774  31'452 0          CAE     IXX
02645                         26,2775  22 007 0          ZL
0265                          26,2776  0 0006 1          EXTEND
0266   REF   2 LAST 613       26,2777  11'451 1          DV      TEMPINER
0267                          26,3000  6 0000 1          DOUBLE
0268   REF   8 LAST 509       26,3001  55'440 1          TS      1/2JTSP         SCALED BY 1/PI (+8)

0269   REF  26 LAST 612       26,3002  3 7762 0          CAF     BIT2
0270                          26,3003  0 0006 1          EXTEND
0271                          26,3004  02 030 0          RAND    30
0272   REF 273 LAST 612       26,3005  10 000 0          CCS     A               COMPUTE L,PVT-CG IF IN DESCENT
0273   REF   1                26,3006  1 3010 1          TCF     DES
0274   REF   1                26,3007  1 3132 0          TCF     CONT1/AC
0275   REF 140 LAST 594       26,3010  4 7763 0  DES     CS      ONE
0276   REF   4 LAST 612       26,3011  55'620 0          TS      INERCTR
0277   REF   6 LAST 612       26,3012  55'621 1          TS      INERCTRX
0278   REF   1                26,3013  1 2726 1          TCF     STCTR1

0279   REF   3 LAST 613       26,3014  3 1451 0  LRESC   CA      TEMPINER        SCALED AT (+6)
0280                          26,3015  0 0006 1          EXTEND
0281   REF  37 LAST 596       26,3016  7 7760 0          MP      BIT4
0282   REF   1                26,3017  23'450 1          LXCH    L,PVT-CG        SCALED AT 2(+3)

0283   REF   1                26,3020  3 3173 1          CA      GFACT
0284   REF 256 LAST 467       26,3021  54 144 1          TS      MPAC            FOR DIVISION LATER

R0285  THIS SECTION COMPUTES THE RATE OF CHANGE OF ACCELERATION DUE TO THE ROTATION OF THE GIMBALS.  THE EQUATION IMPLE
R0287  MENTED IN BOTH THE Y-X PLANE AND THE Z-X PLANE IS --  D(ALPHA)/DT = TL/I*D(DELTA)/DT , WHERE
R0289        T = ENGINE THRUST FORCE
R0290        L = PIVOT TO CG DISTANCE OF ENGINE
R0291        I = MOMENT OF INERTIA
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```
0292  REF   4 LAST  88                    E5          EBANK= ABDELV
0293  REF   4 LAST 480          26,3022  3 5661 0      CA     EBANK5        CHANGE EBANK TO GET ABDELV
0294  REF 274 LAST 613          26,3023  22 000 1      EXCH   A             THIS IS NECESSARY TO PRESERVE A WHILE
0295  REF  39 LAST 586          26,3024  22 003 1      EXCH   EBANK         SWITCHING EBANKS

0296  REF   5 LAST 614          26,3025  31'534 1      CAE    ABDELV        SCALED AT 2(13) CM/SEC(2)
0297  REF  40 LAST 614          26,3026  22 003 1      EXCH   EBANK         RESTORE EBANK LEAVING A UNHARMED

0298  REF   5 LAST 613                    E6          EBANK= IXX

0299                            26,3027  0 0006 1      EXTEND
0300  REF   4 LAST 612          26,3030  7 1320 0      MP     MASS          SCALED AT 2(15) KG.
0301                            26,3031  0 0006 1      EXTEND
0302  REF 257 LAST 613          26,3032  10 144 1      DV     MPAC          CONTAINS GFACT
R0303 MASS IS DIVIDED BY ACCELERATION OF GRAVITY IN ORDER TO MATCH THE UNITS OF IXX,IYY,IZZ, WHICH ARE SLUG-FT(2).
R0305 THE RATIO OF ACCELERATION FROM PIPAS TO ACCELERATION OF GRAVITY IS THE SAME IN METRIC OR ENGINEERING UNITS, SO
R0307 THAT IS UNCONVERTED.  2.20462 CONVERTS KG. TO LB.  NOW T IS IN A SCALED AT 2(14).

0309                            26,3033  0 0006 1      EXTEND
0310  REF   1                  26,3034  7 3174 1      MP     DELDOT26      .2 DEG/SEC AT PI/64 RADIANS/SECOND
0311                            26,3035  0 0006 1      EXTEND
0312  REF   2 LAST 613          26,3036  7 1450 0      MP     L,PVT-CG      SCALED AT 8 FEET.
0313                            26,3037  0 0004 0      INHINT
0314  REF 258 LAST 614          26,3040  52 145 0      DXCH   MPAC          SINCE THIS IS A JOB, MPAC IS AVAILABLE
0315                            26,3041  0 0006 1      EXTEND
0316  REF 259 LAST 614          26,3042  3 0145 1      DCA    MPAC
0317                            26,3043  0 0006 1      EXTEND
0318  REF   2 LAST 613          26,3044  11'454 1      DV     IZZ           SCALED AT 2(18) SLUG-FT(2)
0319  REF   1                   26,3045  55'534 0      TS     ACCDOTR       SCALED AT PI/2(7)
0320                            26,3046  0 0006 1      EXTEND
0321  REF 260 LAST 614          26,3047  3 0145 1      DCA    MPAC
0322                            26,3050  0 0006 1      EXTEND
0323  REF   2 LAST 613          26,3051  11'453 0      DV     IYY           SCALED AT 2(18) SLUG-FT(2)
0324  REF   7 LAST 603          26,3052  55'532 0      TS     ACCDOTQ       SCALED AT PI/2(7)
0325                            26,3053  0 0006 1      EXTEND
0326  REF   1                   26,3054  7 3167 0      MP     DGBF          .3ACCDOTQ SCALED AT PI/2(8)
0327  REF   5 LAST 595          26,3055  55'526 0      TS     KQ
0328                            26,3056  0 0006 1      EXTEND
0329                            26,3057  7 0000 0      SQUARE
0330  REF   1                   26,3060  55'527 1      TS     KQ2           KQ(2)

0331  REF   2 LAST 614          26,3061  31'534 1      CAE    ACCDOTR       .3ACCDOTR AT PI/2(8)
0332                            26,3062  0 0006 1      EXTEND
0333  REF   2 LAST 614          26,3063  7 3167 0      MP     DGBF
0334  REF   1                   26,3064  55'530 1      TS     KRDAP
0335                            26,3065  0 0006 1      EXTEND
0336                            26,3066  7 0000 0      SQUARE
0337  REF   1                   26,3067  55'531 0      TS     KR2

033702                          26,3070  0 0006 1      EXTEND               NOW COMPUTE QACCDOT, RACCDOT, THE SIGNED
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033704                          26,3071  00 012 1          READ    12          JERK TERMS.  STORE CHANNEL 12, WITH GIM
033706 REF 251 LAST 614         26,3072  54 145 0          TS      MPAC +1     BAL DRIVE BITS 9 THROUGH 12.  SET LOOP
033708 REF  27 LAST 613         26,3073  3 7762 0          CAF     BIT2        INDEX TO COMPUTE RACCDOT, THEN QACCDOT.
03371  REF   1                  26,3074  1 3076 1          TCF     LOOP3
033712 REF 253 LAST 609         26,3075  3 7767 0          CAF     ZERO        ACCDOTQ AND ACCDOTR ARE NOT NEGATIVE,
033714 REF 252 LAST 615         26,3076  54 144 1  LOOP3    TS      MPAC        BECAUSE THEY ARE MAGNITUDES
033716 REF 253 LAST 615         26,3077  3 0145 1          CA      MPAC +1
033718 REF 254 LAST 615         26,3100  50 144 0          INDEX   MPAC        MASK CHANNEL IMAGE FOR ANY GIMBAL MOTION
03372  REF   1                  26,3101  7 3125 0          MASK    GIMBITS
033722                          26,3102  0 0006 1          EXTEND
033724 REF   1                  26,3103  1 3117 1          BZF     ZACCDOT     IF NONE, Q(R)ACCDOT IS ZERO.
033726 REF 255 LAST 615         26,3104  3 0145 1          CA      MPAC +1
033728 REF 256 LAST 615         26,3105  50 144 0          INDEX   MPAC        GIMBAL IS MOVING.  IS ROTATION POSITIVE.
03373  REF   2 LAST 615         26,3106  7 3126 0          MASK    GIMBITS +1
033732                          26,3107  0 0006 1          EXTEND
033734 REF   1                  26,3110  1 3114 1          BZF     FRSTZERO    IF NOT POSITIVE, BRANCH
033736 REF 257 LAST 615         26,3111  50 144 0          INDEX   MPAC        POSITIVE ROTATION, NEGATIVE Q(R)ACCDOT.
033738 REF   8 LAST 614         26,3112  4 1532 0          CS      ACCDOTQ
03374  REF   1                  26,3113  1 3120 0          TCF     STACCDOT
033742 REF 258 LAST 615         26,3114  50 144 0  FRSTZERO INDEX   MPAC        NEGATIVE ROTATION, POSITIVE Q(R)ACCDOT.
033744 REF   9 LAST 615         26,3115  3 1532 1          CA      ACCDOTQ
033746 REF   2 LAST 615         26,3116  1 3120 0          TCF     STACCDOT
033748 REF 204 LAST 615         26,3117  3 7767 0  ZACCDOT CAF     ZERO
03375  REF 259 LAST 615         26,3120  50 144 0  STACCDOT INDEX   MPAC
033752 REF   8 LAST 603         26,3121  55 533 1          TS      QACCDOT     STORE Q(R)ACCDOT, COMPLEMENTED.
033754 REF 270 LAST 615         26,3122  10 144 1          CCS     MPAC
033756 REF   2 LAST 615         26,3123  1 3075 1          TCF     LOOP3 -1    NOW DO QACCDOT.
033758                          26,3124  1 3131 0          TCF     +5          LOOP COMPLETED.  RELINT IS SAFE NOW.
03376                           26,3125   01400 1  GIMBLBTS OCTAL   01400
033762                          26,3126   00400 0           OCTAL   00400       BECAUSE OF TRIM GIMBAL POLARITY CHANGE,
033764                          26,3127   06000 1           OCTAL   06000       THESE BIT VALUES CAUSE Q(R)ACCDOT TO BE
033766                          26,3130   02000 0           OCTAL   02000       GENERATED WITH INVERTED SIGN.

0338                            26,3131  0 0003 1          RELINT

0339                            26,3132  0 0006 1  CONT1/AC EXTEND
0340   REF   1                  26,3133  3 3172 0          QCA     CONTCADR
0341                            26,3134  52 005 0          QTCF
0342                            26,3135   37573 1          DEC     0.99191
0343                            26,3136   77763 0  INERCONC DEC     -.00071
0344                            26,3137   46570 1          DEC     -.78052
0345                            26,3140   46556 0          DEC     -.79009
0346                            26,3141   00051 0          DEC     0.00249
0347                            26,3142   54334 1          DEC     -.61154
0348                            26,3143   54406 1          DEC     -.60892
0349                            26,3144   46353 0          DEC     -.79812
0350                            26,3145   05463 0  INERCONB DEC     0.17497
0351                            26,3146   26214 1          DEC     0.69605
0352                            26,3147   25021 0          DEC     0.65726
0353                            26,3150   05676 0          DEC     0.18347
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0354                  26,3151  05006 1            2DEC    0.15660
0355                  26,3152  12613 0            2DEC    0.33662
0356                  26,3153  06364 0            2DEC    0.20239
0357                  26,3154  00012 1  INVERCON A 2DEC    0.00064
0358                  26,3155  75650 0            2DEC    -.06778
0359                  26,3156  76334 1            2DEC    -.04904
0360                  26,3157  77740 1            2DEC    -.00192
0361                  26,3160  00043 0            2DEC    0.00211
0362                  26,3161  77446 1            2DEC    -.01324
0363                  26,3162  00047 1  TORKJET   2DEC    0.002428512
C0363                 26,3163  31173 0
0364                  26,3164  00053 1  TORKJET1  2DEC    0.003671365
C0364                 26,3165  30441 0
0365                  26,3166  23712 1  4JTORK    2DEC    .62170
0366                  26,3167  23146 0  DSBF      2DEC    0.6          .3 SCALED AT 1/2
0367                  26,3170  13241 1  0.35356   2DEC    0.35356      0.70711 SCALED AT +1


0368                  26,3171  41440 1  CONTCADR  2FCADR 1/ACCONT
C0368  REF  1         26,3172  03440 1
0369                  26,3173  00674 1  GFACT     OCTAL   00674        979.24/2.20462 SCALED AT 2(14)
0370                  26,3174  02215 0  DELDOT26  2DEC    .07111       0.2 DEG/SEC SCALED AT PI/64 RAD/SEC
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P0371  PROGRAM NAME: 1/ACCONT          MOD. NO. 2  DATE: JANJARY 9, 1967
R0372  PROGRAM DESIGN BY: RICHARD D. GOSS (MIT/IL)

R0373  IMPLEMENTATION BY: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0374  LAST MODIFICATION BY: JONATHAN D. ADDELSTON
R0375  THIS PROGRAM IS PART OF AN EXECUTIVE JOB AND CALCULATES:

R0376            1. THE INVERSES OF THE NET ACCELERATIONS ABOUT ALL AXES (Q,R,U,V), IN ALL DIRECTIONS (+/-), AND ALL
R0378               COMBINATIONS OF JETS (2/4 FOR Q,R AND 1/2 FOR J,V).
R0379            2. THE INVERSES OF THE MINIMUM ACCELERATIONS FOR THE URGENCY AND TJETLAW COMPUTATION, DURING APS BURNS.
R0381            3. THE INITIAL INVERSE NET ACCELERATIONS USED FOR THE URGENCY COMPUTATION, DURING APS BURNS.
R0383            4. THE NJ FLAGS TO REQUIRE MANDATORY JET ACCELERATION DURING APS BURNS.

R0385  SUBROUTINES CALLED: INVACC.

R0386  CALLING SEQUENCE: CONTROL IS TRANSFERRED HERE FROM 1/ACCS SECTION.

R0387  NORMAL EXIT: ENDOFJOB.          ALARM/ABORT EXITS: NONE.

R0388  INPUT: AOSQ,AOSR,AOSJ,AOSV,1JACCQ,1JACCR,1JACCJ,1JACCV,APSGOING/DAPBOOLS.

R0390  DEBRIS: NONE.
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 0391                                  20,3440          BANK   20
 0392  REF  14 LAST 609                  E6              EBANK= AOSQ

R0393  SET JOB LOOP FOR FOUR AXES (IN THE ORDER: V,U,R,Q):

 0394  REF  29 LAST 612    20,3440  3 6311 1  1/ACCONT CAF    THREE          JOBAXES IS USED TO PICK UP ONE OF FOUR,
 0395  REF   1             20,3441  54 144 1  INVLOOP  TS     JOBAXES        ADJACENT REGISTERS, ALSO TO COUNT LOOP.

R0396  SET JOB "TABPLACE" TO STORE 1/NETACC TABLE:

 0397                      20,3442  0 0006 1           EXTEND
 0398  REF  20 LAST 543    20,3443  7 7761 1           MP     FOUR           TABPLACE = 4(JOBAXES)
 0399  REF   1             20,3444  22 146 1           LXCH   TABPLACE       SINCE THERE ARE FOUR ENTRIES PER AXIS.

R0400                                                          2
R0401          2(1JACC    ) + AOS    = 0.02 RADIANS/SECOND  GREATER THAN ZERO
R0402              Q,R        Q,R
R0403        OR                                               2
R0404            1JACC      + AOS    = 0.02 RADIANS/SECOND  GREATER THAN ZERO
R0405              U,V        U,V

 0406  REF   2 LAST 618    20,3445  50 144 0           INDEX  JOBAXES        THE INDEXED PICK-UP OF JET ACCELERATIONS
 0407  REF   4 LAST 613    20,3446  31'614 0           CAE    1JACCQ         USES THE FOLLOWING HAPPY COINCIDENCE:
 0408  REF   1             20,3447  54 150 1           TS     TEMPACC        1JACCU AND 1JACCV ARE SCALED AT PI/2 AS
 0409  REF   3 LAST 618    20,3450  50 144 0           INDEX  JOBAXES        ARE AOSU AND AOSV.  1JACCQ AND 1JACCR
 0410  REF  15 LAST 618    20,3451  6 1660 0           AD     AOSQ           ARE SCALED AT PI/4 AND THEREFORE ARE
 0411  REF   1             20,3452  54 151 0           TS     TEMPNET        EQUIVALENT TO 2(1JACCQ) AND 2(1JACCR)
 0412  REF   1             20,3453  6 3753 0           AD     -.02R/S2       SCALED AT PI/2, AS ARE AOSQ AND AOSR.
 0413                      20,3454  0 0006 1           EXTEND
 0414  REF   1             20,3455  6 3754 1           BZMF   FIFTY1         (BRANCH FOR CONSTANT VALUE OF INVERSE.)

R0415            1/NET+2    = 1/( 2(1JACC    ) + AOS    )
R0416                Q,R             Q,R        Q,R
R0417          OR
R0418            1/NET+1    = 1/(   1JACC      + AOS    )
R0419                U,V             U,V        U,V

 0420  REF   1             20,3456  0 3762 1           TC     INVACC
 0421  REF   2 LAST 618    20,3457  50 146 1  FIFTY1R  INDEX  TABPLACE
 0422  REF  17 LAST  57    20,3460  55'676 0           TS     1/NET+2Q       SCALED AT 2(+8)/PI SECONDS(2)/RADIAN.

R0423                                                          2
R0424          2(1JACC    ) - AOS    = 0.02 RADIANS/SECOND  GREATER THAN ZERO
R0425              Q,R        Q,R
R0426        OR                                               2
R0427            1JACC      - AOS    = 0.02 RADIANS/SECOND  GREATER THAN ZERO
R0428              U,V        U,V

 0429  REF   4 LAST 618    20,3461  50 144 0           INDEX  JOBAXES        THIS SECTION USES THE INDEXING TRICKS OF
 0430  REF  16 LAST 618    20,3462  4 1660 1           CS     AOSQ           THE FIRST PART (ABOVE), BUT USES THE
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```
 0431   REF   1                20,3463  54 147 1          TS     TEMPAOS     TEMPORARY LOCATIONS AS FOLLOWS:
 0432   REF   2 LAST 618        20,3464  6 0150 0          AD     TEMPACC     "TEMPAOS" SAVES -AOS FOR THIS AXIS.
 0433   REF   2 LAST 618        20,3465  54 151 0          TS     TEMPNET     "TEMPACC" HAS THE JET ACCELERATION.
 0434   REF   2 LAST 618        20,3466  6 3753 0          AD     -.02R/S2    C(TEMPNET) ARE (JETACC-AOS) FOR DENOM.
 0435                           20,3467  0 0006 1          EXTEND
 0436   REF   1                20,3470  6 3756 0          BZMF   FIFTY2      (BRANCH FOR CONSTANT VALUE OF INVERSE.)

R0437                1/NET-2     = 1/( 2(1JACC   ) - AOS   )
R0438                      Q,R             Q,R       Q,R
R0439              OR
R0440                1/NET-1     = 1/(   1JACC     - AOS   )
R0441                      U,V             U,V       J,V

 0442   REF   2 LAST 618        20,3471  0 3762 1          TC     INVACC
 0443   REF   3 LAST 618        20,3472  50 146 1  FIFTY2R  INDEX  TABPLACE
 0444   REF   1                20,3473  55'700 0          TS     1/NET-2Q    SCALED AT 2(+8)/PI SECONDS(2)/RADIAN.

R0445                1/NET-4     = 1/( 4(1JACC   ) - AOS   )
R0446                      Q,R             Q,R       Q,R
R0447              OR
R0448                1/NET-2     = 1/( 2(1JACC   ) - AOS   )
R0449                      U,V             U,V       U,V

 0450   REF   3 LAST 619        20,3474  30 150 0          CAE    TEMPACC     FIRST, FROM 2(1JACCQ,R) FORM 4(1JACCQ,R)
 0451                           20,3475  6 0000 1          DOUBLE             OR FROM 1JACCU,V FORM 2(1JACCU,V) AND
 0452   REF   4 LAST 619        20,3476  54 150 1          TS     TEMPACC     SAVE FOR NEXT INVERSE CALCULATION.
 0453   REF   2 LAST 619        20,3477  6 0147 0          AD     TEMPAOS     THEN, COMPUTE EITHER 4(1JACCQ,R)-AOSQ,R
 0454   REF   3 LAST 619        20,3500  54 151 0          TS     TEMPNET     OR 2(1JACCU,V)-AOSU,V SCALED AT PI/2.

 0455   REF   3 LAST 619        20,3501  0 3762 1          TC     INVACC
 0456   REF   4 LAST 619        20,3502  50 146 1          INDEX  TABPLACE
 0457   REF   1                20,3503  55'701 1          TS     1/NET-4Q    SCALED AT 2(+8)/PI SECONDS(2)/RADIAN.

R0458                1/NET+4     = 1/( 4(1JACC   ) + AOS   )
R0459                      Q,R             Q,R       Q,R
R0460              OR
R0461                1/NET+2     = 1/( 2(1JACC   ) + AOS   )
R0462                      U,V             U,V       U,V

 0463   REF   3 LAST 619        20,3504  4 0147 1          CS     TEMPAOS     FIRST, COMPUTE EITHER 4(1JACCQ,R)+AOSQ,R
 0464   REF   5 LAST 619        20,3505  6 0150 0          AD     TEMPACC     OR 2(1JACCU,V)+AOSU,V AND SAVE FOR THE
 0465   REF   4 LAST 619        20,3506  54 151 0          TS     TEMPNET     DIVISION (SCALED AT PI/2 RADIANS/SECOND)

 0466   REF   4 LAST 619        20,3507  0 3762 1          TC     INVACC
 0467   REF   5 LAST 619        20,3510  50 146 1          INDEX  TABPLACE
 0468   REF   1                20,3511  55'677 1          TS     1/NET+4Q    SCALED AT 2(+8)/PI RADIANS(2)/SECOND.

R0469   TEST FOR END OF LOOP:

 0470   REF   5 LAST 618        20,3512  10 144 1          CCS    JOBAXES     IF "JOBAXES" PNZ, CONTINUE.
```

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0471  REF   1                20,3513  1 3441 1          TCF     INVLOOP         IF "JOBAXES" ZERO, STOP.

R0472 TEST FOR ASCENT PROPULSION SYSTEM BURN:

0473  REF   3 LAST 517      20,3514  3 7754 0          CAF     APSGOING        IF LM IS IN COAST OR IN A DESCENT BURN,
0474  REF  49 LAST 593      20,3515  7 0077 0          MASK    DAPBOOLS        THEN THE AOSJOB IS TRIVIAL FROM HERE
0475  REF 275 LAST 614      20,3516  10 000 0          CCS     A               AND THIS TEST REDUCES THE COMPUTATION
0476  REF   1                20,3517  1 3531 1          TCF     ASCJOB          TIME IN THOSE CASES.

R0477 FILL IN DESCENT BURN OR COAST VALUES QUICKLY:

0478  REF  18 LAST 618      20,3520  31'676 1          CAE     1/VET+2Q        FOR Q-AXIS URGENCY.
0479  REF   4 LAST 537      20,3521  55'717 0          TS      1/ACCQ
0480  REF   2 LAST  57      20,3522  31'702 0          CAE     1/VET+2R        FOR R-AXIS URGENCY.
0481  REF   1                20,3523  55'720 1          TS      1/ACCR

0482                         20,3524  0 0004 0          INHINT
0483  REF  50 LAST 620      20,3525  4 0077 0  POPNONJ  CS      DAPBOOLS        SET BIT TO INDICATE DATA GOOD.
0484  REF   2 LAST 488      20,3526  7 7761 1          MASK    DATAGOOD
0485  REF  51 LAST 620      20,3527  26 077 0          ADS     DAPBOOLS
0486  REF  59 LAST 497      20,3530  1 5567 1          TCF     ENDOFJOB        END THIS ITERATION OF AOSJOB.
```

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```
P0487   IN ASCENT BURN, SO SET UP Q,R-AXES LOOP:

 0488   REF  30 LAST 618     20,3531  3 6311 1  ASCJOB   CAF     THREE          SET UP THE TABLE INDICES:
 0489   REF   6 LAST 619     20,3532  54 144 1  QRJOB    TS      JOBAXES
 0490                        20,3533  6 0000 1           DOUBLE                 AOS TABLE USES "JOBAXES"  (ADJACENT).
 0491   REF   1              20,3534  54 145 0           TS      NJPLACE        NJ  TABLE USES "NJPLACE"  (ONE APART).
 0492                        20,3535  6 0000 1           DOUBLE                 NET TABLE USES "TABPLACE" (THREE APART).
 0493   REF   6 LAST 619     20,3536  54 146 0           TS      TABPLACE

R0494                                                                2
R0495   TEST ABVAL(AOS    ) - 0.02 RADIANS/SECOND  GREATER THAN ZERO:
R0496                Q,R

 0497   REF   7 LAST 621     20,3537  50 144 0           INDEX   JOBAXES        FORM ABVAL(AOS    ) AND SAVE FOR INVACC.
 0498   REF  17 LAST 618     20,3540  11'660 1           CCS     AOSQ                                  Q,R
 0499   REF 141 LAST 613     20,3541  6 7763 1           AD      ONE
 0500                        20,3542  1 3544 0           TCF     +2
 0501   REF 142 LAST 621     20,3543  6 7763 1           AD      ONE
 0502   REF   5 LAST 619     20,3544  54 151 0           TS      TEMPNET
 0503   REF   3 LAST 619     20,3545  6 3753 0           AD      -.02R/S2       -0.02 RADIANS/SECOND(2) AT PI/2
 0504                        20,3546  0 0006 1           EXTEND
 0505   REF   1              20,3547  6 3760 0           BZMF    FIFTY3         (BRANCH FOR CONSTANT VALUE OF INVERSE.)

R0506   CALCULATE 1/AMIN    = 1/ABVAL(AOS    ):
R0507                Q,R              Q,R

 0508   REF   5 LAST 619     20,3550  0 3762 1           TC      INVACC         (USE SUBROUTINE FOR INVERSE.)
 0509   REF   8 LAST 621     20,3551  50 144 0  FIFTY3R  INDEX   JOBAXES
 0510   REF   6 LAST 543     20,3552  55'721 0           TS      1/AMINQ        SAVE FOR USE BY URGENCY CALCULATIONS.

 0511   REF   9 LAST 621     20,3553  4 0144 1           CS      JOBAXES        2 - C(JOBAXES) CAUSES A BRANCH ONLY WHEN
 0512   REF  31 LAST 612     20,3554  6 7762 0           AD      TWO            C(JOBAXES) = 3 OR 2, I.E. WHEN DOING
 0513                        20,3555  0 0006 1           EXTEND                 U- OR V-AXIS PASS OF LOOP ONLY SET UP
 0514   REF   1              20,3556  6 3703 0           BZMF    UVNEXT         1/AMINU OR 1/AMINV, RESPECTIVELY.

R0515                                                                2
R0516   TEST 2(1JACC    ) - ABVAL(AOS    ) - 0.06 RADIANS/SECOND  GREATER THAN ZERO:
R0518                Q,R              Q,R

 0519   REF   6 LAST 621     20,3557  4 0151 0           CS      TEMPNET        "TEMPNET" IS ABVAL(AOSQ,R).
 0520   REF  10 LAST 621     20,3560  50 144 0           INDEX   JOBAXES        SAVE -ABVAL(AOSQ,R) FOR USE IN THE
 0521   REF   1              20,3561  54 152 0           TS      ABVLAOSQ       U,V-AXIS NJ COMPUTATION BELOW.
 0522   REF   4 LAST 489     20,3562  6 1655 0           AD      -.06R/S2       -0.06 RADIANS/SECOND(2) SCALED AT PI/2.
 0523   REF  11 LAST 621     20,3563  50 144 0           INDEX   JOBAXES
 0524   REF   5 LAST 618     20,3564  6 1614 0           AD      1JACCQ         "1JACCQ,R" SCALED AT PI/4 RAD/SEC(2) ARE
 0525                        20,3565  0 0006 1           EXTEND                 2(1JACCQ,R) SCALED AT PI/2 RAD/SEC(2).
 0526   REF   1              20,3566  6 3630 1           BZMF    OVERRIDE

R0527   SET FLAG NOT TO REQUEST MANDATORY FOUR JET OPERATION FOR +Q,+R ROTATION DURING THIS APS BURN (FOR NOW):
```

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```
 0529   REF 205 LAST 615    20,3567  3 7767 0          CAF     ZERO        NJ = 0 ALLOWS THE URGENCY FUNCTIONS TO
 0530   REF   2 LAST 621    20,3570  50 145 1          INDEX   NJPLACE     ACTUALLY SELECT 2 JET ROTATION AS THE
 0531   REF   9 LAST 544    20,3571  55'666 1          TS      NJ+0        OPTIMAL POLICY.

R0532   TEST SIGN(AOS   ):
R0533                Q,R

 0534   REF  12 LAST 621    20,3572  50 144 0          INDEX   JOBAXES     THE SIGN OF AOSQ,R DETERMINES THE RATIO
 0535   REF  18 LAST 621    20,3573  31'660 0          CAE     AOSQ        TO BE COMPUTED AS THE CORRECTION FACTOR
 0536                       20,3574  0 0006 1          EXTEND               IN THE URGENCY FUNCTION CALCULATION AND
 0537   REF   1             20,3575  6 3613 0          BZMF    JRGRAT2     ALSO SPECIFIES THE CORRECT NJ VALUES.

R0538   FIRST CASE FOR URGENCY RATIO:

 0539   REF   7 LAST 621    20,3576  50 146 1  JRGRAT1 INDEX   TABPLACE    CHOOSE THE -2 JET NET ACCELERATION
 0540   REF   2 LAST 619    20,3577  31'700 1          CAE     1/NET-2Q    INVERSE FOR USE IN URGENCY COMPUTATION.
 0541   REF  13 LAST 622    20,3600  50 144 0          INDEX   JOBAXES
 0542   REF   5 LAST 620    20,3601  55'717 0          TS      1/ACCQ

 05425                      20,3602  22 007 0          ZL                   PREVENT OVERFLOW FOR SMALL AOSQS
 0543   REF   8 LAST 622    20,3603  50 146 1          INDEX   TABPLACE
 0544   REF  19 LAST 620    20,3604  31'676 1          CAE     1/NET+2Q            1/NET+2Q,R
 0545                       20,3605  0 0006 1          EXTEND  RATIO = ----------
 0546   REF   9 LAST 622    20,3606  5 0146 1          INDEX   TABPLACE            1/NET-2Q,R
 0547   REF   3 LAST 622    20,3607  11'700 0          DV      1/NET-2Q
 0548   REF  14 LAST 622    20,3610  50 144 0          INDEX   JOBAXES
 0549   REF   4 LAST 539    20,3611  55'725 1          TS      JRGRATQ

 0550   REF   1             20,3612  1 3654 1          TCF     SWITNJS     GO TO SET NJS.

R0551   SECOND CASE FOR URGENCY RATIO:

 0552   REF  10 LAST 622    20,3613  50 146 1  JRGRAT2 INDEX   TABPLACE    CHOOSE THE +2 JET NET ACCELERATION
 0553   REF  20 LAST 622    20,3614  31'676 1          CAE     1/NET+2Q    INVERSE FOR USE IN URGENCY COMPUTATION.
 0554                       20,3615  22 007 0          ZL                   PREVENT OVERFLOW ON ZERO BZMF BRANCH.
 0555   REF  15 LAST 622    20,3616  50 144 0          INDEX   JOBAXES
 0556   REF   6 LAST 622    20,3617  55'717 0          TS      1/ACCQ

 0557   REF  11 LAST 622    20,3620  50 146 1          INDEX   TABPLACE
 0558   REF   4 LAST 622    20,3621  31'700 1          CAE     1/NET-2Q            1/NET-2Q,R
 0559                       20,3622  0 0006 1          EXTEND  RATIO = ----------
 0560   REF  12 LAST 622    20,3623  5 0146 1          INDEX   TABPLACE            1/NET+2Q,R
 0561   REF  21 LAST 622    20,3624  11'676 0          DV      1/NET+2Q
 0562   REF  16 LAST 622    20,3625  50 144 0          INDEX   JOBAXES
 0563   REF   5 LAST 622    20,3626  55'725 1          TS      JRGRATQ

 0564   REF   1             20,3627  1 3700 1          TCF     NXTNJZER    GO TO SET NJS.

R0565   SET FLAG TO INDICATE MANDATORY USE OF FOUR JETS TO FIGHT THE OFFSET ACCELERATION:
```

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L       AOSTASK AND AOSJOB                                              USER'S OWN PAGE NO.  19          S3  E6

 0567   REF 143 LAST 621    20,3630  3 7763 1  OVERRIDE CAF    ONE       (THIS SHOULD BE DONE BEFORE THE INHINT.)

 0568                       20,3631  0 0004 0            INHINT          PREVENT POSSIBLY EPHEMERAL MANDATORY NJ
A0569                                                                   SETTING FROM AFFECTING JET SELECTION.
 0570   REF   3 LAST 622    20,3632  50 145 1            INDEX   NJPLACE  NJ = 1 FORCES THE URGENCY FUNCTIONS TO
 0571   REF  10 LAST 622    20,3633  55'666 1            TS      NJ+2      ACTUALLY SELECT 4 JET ROTATION AS THE
A0572                                                                   OPTIMAL POLICY (TO FIGHT THE AOS).

R0573   TEST SIGN(AOS   ):
R0574                Q,R

 0575   REF  17 LAST 622    20,3634  50 144 0            INDEX   JOBAXES   THE SIGN OF AOSQ,R DETERMINES THE RATIO
 0576   REF  19 LAST 622    20,3635  31'660 0            CAE     AOSQ      TO BE COMPUTED AS THE CORRECTION FACTOR
 0577                       20,3636  0 0006 1            EXTEND            IN THE URGENCY FUNCTION CALCULATION AND
 0578   REF   1             20,3637  6 3663 1            BZMF    JRGRAT4   ALSO SPECIFIES THE CORRECT NJ VALUES.

R0579   THIRD CASE FOR URGENCY RATIO:

 0580   REF  13 LAST 622    20,3640  50 146 1  JRGRAT3   INDEX   TABPLACE  CHOOSE THE -4 JET NET ACCELERATION
 0581   REF   2 LAST 619    20,3641  31'701 0            CAE     1/NET-4Q  INVERSE FOR USE IN URGENCY COMPUTATION.
 0582   REF  18 LAST 623    20,3642  50 144 0            INDEX   JOBAXES
 0583   REF   7 LAST 622    20,3643  55'717 0            TS      1/ACCQ

05835                       20,3644  22 007 0            ZL
 0584   REF  14 LAST 623    20,3645  50 146 1            INDEX   TABPLACE
 0585   REF  22 LAST 622    20,3646  31'676 1            CAE     1/NET+2Q          1/NET+2Q,R
 0586                       20,3647  0 0006 1            EXTEND  RATIO = ----------
 0587   REF  15 LAST 623    20,3650  5 0146 1            INDEX   TABPLACE         1/NET-4Q,R
 0588   REF   3 LAST 623    20,3651  11'701 1            DV      1/NET-4Q
 0589   REF  19 LAST 623    20,3652  50 144 0            INDEX   JOBAXES
 0590   REF   6 LAST 622    20,3653  55'725 1            TS      JRGRATQ

R0591   RESET VALUES OF NJS FOR Q,R-AXIS:

 0592   REF 206 LAST 622    20,3654  3 7767 0  SWITNJS   CAF     ZERO      SET NJ      = NJ      (FROM ABOVE)
 0593   REF   4 LAST 623    20,3655  50 145 1            INDEX   NJPLACE        -Q,-R     +Q,+R
 0594   REF  11 LAST 623    20,3656  57'666 0            XCH     NJ+2      AND
 0595   REF   5 LAST 623    20,3657  50 145 1            INDEX   NJPLACE       NJ      = 0.
 0596   REF   2 LAST 541    20,3660  55'667 0            TS      NJ-2            +Q,+R

 0597                       20,3661  0 0003 1            RELINT            SINCE NJS NOW VALID, ALLOW INTERRUPTS.

 0598   REF   2 LAST 621    20,3662  1 3703 1            TCF     JVNEXT    GO TEST FOR ENTRY TO U,V-AXES LOGIC.

R0599   FOURTH CASE FOR URGENCY RATIO:

 0600                       20,3663  0 0003 1  JRGRAT4   RELINT            SINCE ALL NJS ALREADY SET ARE NOW KNOWN
A0601                                                                   TO BE VALID, ALLOW INTERRUPTS.

 0602   REF  16 LAST 623    20,3664  50 146 1            INDEX   TABPLACE  CHOOSE THE +4 JET NET ACCELERATION
```

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0603  REF   2 LAST 619   20,3665  31'677 0          CAE    1/NET+4Q      INVERSE FOR USE IN URGENCY COMPUTATION.
0604                     20,3666  22 007 0          ZL                   ---------------------------------------
0605  REF  20 LAST 623   20,3667  50 144 0          INDEX  JOBAXES
0606  REF   8 LAST 623   20,3670  55'717 0          TS     1/ACCQ

0607  REF  17 LAST 623   20,3671  50 146 1          INDEX  TABPLACE
0608  REF   5 LAST 622   20,3672  31'700 1          CAE    1/NET-2Q              1/NET-2Q,R
0609                     20,3673  0 0006 1          EXTEND        RATIO = ----------
0610  REF  18 LAST 624   20,3674  5 0146 1          INDEX  TABPLACE             1/NET+4Q,R
0611  REF   3 LAST 624   20,3675  11'677 1          DV     1/NET+4Q
0612  REF  21 LAST 624   20,3676  50 144 0          INDEX  JOBAXES
0613  REF   7 LAST 623   20,3677  55'725 1          TS     JRGRATQ

R0614 SET NJ FOR NEGATIVE ROTATIONS;

0615  REF 207 LAST 623   20,3700  3 7767 0  NXTNJZER CAF    ZERO          SET NJ      = 0  TO LET THE URGENCY
0616  REF   6 LAST 623   20,3701  50 145 1          INDEX  NJPLACE             -Q,-R       FUNCTIONS SELECT 2 JET
0617  REF   3 LAST 623   20,3702  55'667 0          TS     NJ-Q                            -Q,-R ROTATION

R0618 TEST FOR END OF Q,R-AXES LOOP:

0619  REF  22 LAST 624   20,3703  10 144 1  JVNEXT  CCS    JOBAXES       JOBAXES = 1 MEANS GO DO Q-AXIS.
0620  REF   1            20,3704  1 3532 1          TCF    QRJOB         JOBAXES = 0 MEANS GO DO U,V-AXES.
```

L AOSTASK AND AOSJOB USER'S OWN PAGE NO. 21 S3 E6

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P0621   AFTER Q,R-AXES COMPLETE, DO U,V-AXES LOGIC:

 0622                       20,3705  0 0004 0  JVJOB    INHINT                  PREVENT POSSIBLY EPHEMERAL OPTIONAL NJ
A0623                                                                           SETTING FROM AFFECTING JET SELECTION.
 0624   REF   2 LAST 543    20,3706  55'672 1           TS      NJ+J            FIRST, ARBITRARILY SET THE U,V-AXIS NJS
 0625   REF   2 LAST 541    20,3707  55'673 0           TS      NJ-J            TO THE ZERO (OPTIONAL) VALUE UNTIL THE
 0626   REF   2 LAST 541    20,3710  55'674 1           TS      NJ+V            TESTS ON AOS ARE MADE BELOW.  (ZERO IS
 0627   REF   2 LAST 542    20,3711  55'675 0           TS      NJ-V            IN A FROM THE PRECEDING "CCS JOBAXES".)

R0628
R0629   TEST 1JACCQ = ABVAL(AOSQ) = 0.06 RADIANS/SECOND^2 GREATER THAN ZERO:

 0630   REF   6 LAST 621    20,3712  31'614 0           CAE     1JACCQ          1JACCQ SCALED AT PI/4 RADIANS/SECOND(2)
 0631                       20,3713  0 0006 1           EXTEND                  MULTIPLYING BY ONE-HALF CHANGES SCALING
 0632   REF  41 LAST 595    20,3714  7 7746 1           MP      BIT14           TO PI/2 RADIANS/SECOND(2) AS AOSQ.
 0633   REF   5 LAST 621    20,3715  6 1655 0           AD      -.06R/S2        -0.06 RADIANS/SECOND(2) SCALED AT PI/2.
 0634   REF   2 LAST 621    20,3716  6 0152 1           AD      ABVLAOSQ        ABVLAOSQ IS -ABVAL(AOSQ) AT PI/2.
 0635                       20,3717  0 0006 1           EXTEND
 0636   REF   1             20,3720  6 3731 1           BZMF    POPNJ1          (BRANCH TO TEST ON SIGN(AOSQ).)

R0637
R0638   TEST 1JACCR = ABVAL(AOSR) = 0.06 RADIANS/SECOND^2 GREATER THAN ZERO:

 0639   REF   3 LAST 613    20,3721  31'615 1  POPNJ4   CAE     1JACCR          1JACCR SCALED AT PI/4 RADIANS/SECOND(2).
 0640                       20,3722  0 0006 1           EXTEND                  MULTIPLYING BY ONE-HALF CHANGES SCALING
 0641   REF  42 LAST 625    20,3723  7 7746 1           MP      BIT14           TO PI02 RADIANS/SECOND(2) AS AOSR.
 0642   REF   6 LAST 625    20,3724  6 1655 0           AD      -.06R/S2        -0.06 RADIANS/SECOND(2) AT PI/2.
 0643   REF   1             20,3725  6 0153 0           AD      ABVLAOSR        ABVLAOSR IS -BAVAL(AOSR) AT PI/2.
 0644                       20,3726  0 0006 1           EXTEND
 0645   REF   1             20,3727  6 3742 0           BZMF    POPNJ2          (BRANCH TO TEST ON SIGN(AOSR).)

 0646   REF   1             20,3730  1 3525 1           TCF     POPNONJ         GO SET DATA GOOD BIT.


 0647   REF  20 LAST 623    20,3731  11'660 1  POPNJ1   CCS     AOSQ            SINCE MAGNITUDE OF AOSQ LARGE, NONZERO.
 0648   REF   1             20,3732  1 3737 0           TCF     POPNJ3
 0649   REF  36 LAST 603    20,3733  0 4736 1           TC      CCSHOLE
 0650   REF   3 LAST 625    20,3734  55'672 1           TS      NJ+J            SET NJS FOR LARGE NEGATIVE AOSQ.
 0651   REF   3 LAST 625    20,3735  55'675 0           TS      NJ-V
 0652   REF   1             20,3736  1 3721 1           TCF     POPNJ4          GO CHECK MAGNITUDE OF AOSR.

 0653   REF   3 LAST 625    20,3737  55'673 0  POPNJ3   TS      NJ-J            SET NJS FOR LARGE POSITIVE AOSQ.
 0654   REF   3 LAST 625    20,3740  55'674 1           TS      NJ+V
 0655   REF   2 LAST 625    20,3741  1 3721 1           TCF     POPNJ4          GO CHECK MAGNITUDE OF AOSR.

 0656   REF   8 LAST 609    20,3742  11'661 0  POPNJ2   CCS     AOSR            SINCE MAGNITUDE OF AOSR LARGE, NONZERO.
 0657   REF   1             20,3743  1 3750 1           TCF     POPNJ5
 0658                       20,3744   11642 1  ACCFIFTY DEC     0.30679         .5(50) SEC(2)/RAD SCALED AT 2(+8)/PI.
```

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0659  REF   4 LAST 625    20,3745  55'672 1          TS    NJ+J      SET NJS FOR LARGE NEGATIVE AOSR.
0660  REF   4 LAST 625    20,3746  55'674 1          TS    NJ+V
0661  REF   2 LAST 625    20,3747  1 3525 1          TCF   POPNONJ   END NICELY.

0662  REF   4 LAST 625    20,3750  55'673 0  POPNJS  TS    NJ-J      SET NJS FOR LARGE POSITIVE AOSR.
0663  REF   4 LAST 625    20,3751  55'675 0          TS    NJ-V
0664  REF   3 LAST 626    20,3752  1 3525 1          TCF   POPNONJ   END NICELY.

06645                      20,3753    77456 0  -.02R/S2 DEC   -.01273   -0.02 RADIANS/SECOND(2) AT PI/2

R0665  THE FOLLOWING BRANCHES SUPPLY CONSTANT VALUES:

0666  REF   2 LAST 478    20,3754  3 3744 0  FIFTY1  CAF   ACCFIFTY
0667  REF   1            20,3755  1 3457 0          TCF   FIFTY1R

0668  REF   3 LAST 626    20,3756  3 3744 0  FIFTY2  CAF   ACCFIFTY
0669  REF   1            20,3757  1 3472 1          TCF   FIFTY2R

0670  REF   4 LAST 626    20,3760  3 3744 0  FIFTY3  CAF   ACCFIFTY
0671  REF   1            20,3761  1 3551 1          TCF   FIFTY3R
```

L AOSTASK AND AOSJOB USER'S OWN PAGE NO. 23 53 E6

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P0672   SUBROUTINE NAME: INVACC        MOD. NO. 0  DATE: DECEMBER 3, 1966

R0673   AUTHOR: JONATHAN D. ADDELSTON (ADAMS ASSOCIATES)

R0674   THIS SUBROUTINE IS CALLED BY AOSJOB TO CALCULATE:

R0675                    0.5    WHERE TEMPNET IS SCALED AT PI/2 RADIANS/SECOND(2)
R0676       C(A) =     --------
R0677                  TEMPNET   AND THE FRACTION IS SCALED AT 2(+8)/PI SEC(2)/RAD.

R0678   THIS SIMPLE COMPUTATION WAS SUBROUTINIZED DUE TO ITS FREQUENT USE.

R0679   CALLING SEQUENCE: TC  INVACC

R0680   SUBROUTINES CALLED: NONE.        NORMAL EXIT MODE: ONE INSTRUCTION AFTER CALL.

R0682   ALARM OR ABORT EXIT MODES: NONE.

R0683   INPUT: TEMPNET SCALED AT PI/2 RADIANS/SECONDS(2).

R0684   OUTPUT: C(A) SCALED AT 2(+8)/PI SECONDS(2)/RADIAN.

R0685   DEBRIS: L,Q.

 0686   REF  36 LAST 595     20,3762  3 7755 1  INVACC   CAF    BIT7        BIT7 IS USED AS THE NUMERATOR 0.5 SINCE
 0687                        20,3763  22 007 0           ZL
 0688                        20,3764  0 0006 1           EXTEND              "TEMPNET" IS SCALED AT PI/2 AND THE
 0689   REF   7 LAST 621     20,3765  10 151 0           DV     TEMPNET
 0690   REF 239 LAST 604     20,3766  0 0002 0           TC     Q            INVERSE IS SCALED AT 2(+8)/PI.
```

L AOSTASK AND AOSJOB USER'S OWN PAGE NO. 24 S3 E6

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P06905 START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

R0691  FROM DPSENGON: SET FLAGS FOR CRITICAL GTS ENTRIES.

 0692  REF   7 LAST 586      20,3767  55'310 0  SETCNTR  TS      DVSELECT        SET SWITCH TO GO TO GIMBLMON

 0693                        20,3770  0 0006 1           EXTEND
 0694  REF   1              20,3771  3 3774 0           DCA     GETADR          SPACE FOR NEW CODING IN BANK 17
 0695  REF  18 LAST 547     20,3772  52 006 0           DXCH    Z

 0696  REF   6 LAST 586                   E6            EBANK=  TRIMCNTR
 0697                       20,3773    02157 0  GETADR  2CADR   GETCNTR
C0697  REF   1              20,3774    36066 1
R0698  **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************
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L SPS BACK-UP RCS CONTROL USER'S OWN PAGE NO. 1 S3

```
0001                                21,3417          BANK    21
0002    REF  28 LAST 594              E6              EBANK=  DT

0004    REF   4 LAST 549  21,3417  4 0775 0  SPSRCS  CS      OMEGAQD
0005    REF  16 LAST 608  21,3420  6 1416 0          AD      OMEGAQ
0006    REF   8 LAST 547  21,3421  55,423 1          TS      EDOTQ       EDOT = OMEGAQ - OMEGAQD

0007    REF  10 LAST 594  21,3422  6 1413 0          AD      ER
0012                      21,3423  0 0006 1          EXTEND              F = 1/4 E + EDOT
0013    REF   1           21,3424  6 3464 1          BZMF    PLUSD       DQ NEGATIVE FOR POSITIVE F

0014    REF   1           21,3425  3 3571 1          CAF     NEGD        STORE DIRECTION TO THRUST IN ITEMP3

0015    REF  22 LAST 509  21,3426  54 063 0  SCOMPUTE TS      ITEMP3
0016    REF   9 LAST 629  21,3427  31,423 0          CAE     EDOTQ
00165                     21,3430  0 0006 1          EXTEND
0017    REF   1           21,3431  7 3570 1          MP      ACONST      ACONST = 2**(-11) X SQRT(1/2A X PI/1024)
00175   REF 276 LAST 620  21,3432  10 000 0          CCS     A
0018    REF   1           21,3433  1 3455 1          TCF     LIMSQQ
00185                     21,3434  1 3436 1          TCF     +2
0019    REF   2 LAST 629  21,3435  1 3455 1          TCF     LIMSQQ
00195   REF 277 LAST 629  21,3436  22 000 1          LXCH    A           A = 2**(3) X SQRT(1/2A X PI/1024)
0020                      21,3437  0 0006 1  LIMRETQ  EXTEND
00205                     21,3440  7 0000 0          SQUARE
0021    REF  37 LAST 603  21,3441  54 062 1          TS      ITEMP2      ITEMP2 = (1/2A) EDOT**2

0022    REF  11 LAST 629  21,3442  6 1413 0          AD      ER
0023    REF   2 LAST 629  21,3443  6 3571 1          AD      NEGD        DB IS SPECIFIED BY NEGD IN SPS MODE

0025                      21,3444  0 0006 1          EXTEND
0026    REF   1           21,3445  6 3472 0          BZMF    JZERO

0027    REF  10 LAST 629  21,3446  31,423 0          CAE     EDOTQ       G WAS POSITIVE, NOW TEST EDOT

0028                      21,3447  0 0006 1          EXTEND
0029    REF   1           21,3450  6 3461 1          BZMF    JLOW

0030    REF  38 LAST 629  21,3451  6 0062 0          AD      ITEMP2      EDOT WAS POSITIVE, CALCULATE HIGH U CASE
0033    REF  12 LAST 629  21,3452  6 1413 0          AD      ER
0036    REF  21 LAST 543  21,3453  55,502 0          TS      JRGENCYQ

0037    REF   1           21,3454  1 3474 1          TCF     RCALC

00374   REF  36 LAST 607  21,3455  3 7743 0  LIMSQQ   CAF     POSMAX
00375   REF   1           21,3456  1 3437 0          TCF     LIMRETQ
00376   REF  37 LAST 629  21,3457  3 7743 0  LIMSQR   CAF     POSMAX
00377   REF   1           21,3460  1 3514 0          TCF     LIMRETR
0038    REF  13 LAST 629  21,3461  6 1413 0  JLOW     AD      ER          EDOT WAS NEGATIVE, CALCULATE LOW J CASE
0041    REF  22 LAST 629  21,3462  55,502 0          TS      JRGENCYQ
```

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0042  REF   2 LAST 629   21,3463  1 3474 1          TCF    RCALC

0043  REF  14 LAST 629   21,3464  4 1413 1  PLUSD   CS     ER
0044  REF  15 LAST 630   21,3465  57,413 0          XCH    ER
0045  REF  11 LAST 629   21,3466  4 1423 1          CS     EDOTQ
0046  REF  12 LAST 630   21,3467  57'423 0          XCH    EDOTQ
0047  REF   3 LAST 629   21,3470  4 3571 0          CS     NEGD
0048  REF   1            21,3471  1 3426 0          TCF    GCOMPUTE

0049  REF 208 LAST 624   21,3472  3 7767 0  UZERO   CAF    ZERO          G = 0, NO URGENCY
0050  REF  23 LAST 629   21,3473  55'502 0          TS     URGENCYQ

0051  REF   6 LAST 549   21,3474  4 0776 0  RCALC   CS     OMEGARD       REPEAT CALCULATIONS FOR R-AXIS
0052  REF  16 LAST 608   21,3475  6 1420 0          AD     OMEGAR
0053  REF   5 LAST 547   21,3476  55'424 0          TS     EDOTR

0057  REF  31 LAST 594   21,3477  6 1411 1          AD     E             F = 1/4 E + EDOT
0059                     21,3500  0 0006 1          EXTEND
0060  REF   1            21,3501  6 3535 1          BZMF   PLUSDR

0061  REF   4 LAST 630   21,3502  3 3571 1          CAF    NEGD

0062  REF  21 LAST 520   21,3503  54 064 1  GCOMPUTR TS     ITEMP4
0063  REF   6 LAST 630   21,3504  31'424 1          CAE    EDOTR
00635                    21,3505  0 0006 1          EXTEND
0064  REF   2 LAST 629   21,3506  7 3570 1          MP     ACONST        ACONST = 2**(-11) X SQRT(1/2A X PI/1024)
00645 REF 278 LAST 629   21,3507  10 000 0          CCS    A
0065  REF   1            21,3510  1 3457 0          TCF    LIMSUR
00655                    21,3511  1 3513 1          TCF    +2
0066  REF   2 LAST 630   21,3512  1 3457 0          TCF    LIMSUR
00665 REF 279 LAST 630   21,3513  22 000 1          LXCH   A             A = 2**(3) X SQRT(1/2A X PI/1024)
0067                     21,3514  0 0006 1  LIMRETR EXTEND
00675                    21,3515  7 0000 0          SQUARE
0068  REF  39 LAST 629   21,3516  54 062 1          TS     ITEMP2

0069  REF  32 LAST 630   21,3517  6 1411 1          AD     E
0070  REF   5 LAST 630   21,3520  6 3571 1          AD     NEGD

0072                     21,3521  0 0006 1          EXTEND
0073  REF   1            21,3522  6 3543 0          BZMF   UZERDR

0074  REF   7 LAST 630   21,3523  31'424 1          CAE    EDOTR

0075                     21,3524  0 0006 1          EXTEND
0076  REF   1            21,3525  6 3532 0          BZMF   JLOWR

0077  REF  40 LAST 630   21,3526  6 0062 0          AD     ITEMP2        EDOT WAS POSITIVE, CALCULATE HIGH U CASE
0080  REF  33 LAST 630   21,3527  6 1411 1          AD     E
0083  REF  21 LAST 543   21,3530  55'504 0          TS     URGENCYR
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```
0084  REF   1                21,3531  1 3545 1          TCF     JRGRECT
0085  REF  34 LAST 630       21,3532  6 1411 1  JLOWR   AD      E          EDOT WAS NEGATIVE, CALCULATE LOW J CASE
0088  REF  22 LAST 630       21,3533  55'504 0          TS      JRGENCYR

0089  REF   2 LAST 631       21,3534  1 3545 1          TCF     JRGRECT
0090  REF  35 LAST 631       21,3535  4 1411 0  PLUSDR  CS      E
0091  REF  36 LAST 631       21,3536  57'411 1          XCH     E
0092  REF   8 LAST 630       21,3537  4 1424 0          CS      EDOTR
0093  REF   9 LAST 631       21,3540  57'424 1          XCH     EDOTR
0094  REF   6 LAST 630       21,3541  4 3571 0          CS      NEGD
0095  REF   1                21,3542  1 3503 0          TCF     GCOMPUTR

0096  REF 229 LAST 630       21,3543  3 7767 0  JZEROR  CAF     ZERO
0097  REF  23 LAST 631       21,3544  55'504 0          TS      JRGENCYR

0098  REF  22 LAST 630       21,3545  10 064 1  JRGRECT  CCS     ITEMP4     DR = ITEMP4, NON-ZERO
0099  REF  24 LAST 631       21,3546  4 1504 0          CS      JRGENCYR   DR POS = POSR JETS = URGENCY NEG
0100  REF  25 LAST 631       21,3547  55'504 0          TS      JRGENCYR   URGENCYR NEGATIVE

0101  REF  23 LAST 629       21,3550  10 063 0          CCS     ITEMP3     DQ = ITEMP3, NON-ZERO
0102  REF  24 LAST 630       21,3551  4 1502 0          CS      JRGENCYQ   DQ POS = POSR JETS = NEGATIVE JRGENCY
0103  REF  25 LAST 631       21,3552  55'502 0          TS      JRGENCYQ

0104  REF   1                21,3553  3 3572 1          CAF     RESADR     RESADR = JETSON AFTER POLICY LOCATION
0105  REF   3 LAST 562       21,3554  54 062 1          TS      TJETADR

0106  REF   6 LAST 575       21,3555  3 7744 1          CAF     NEG1/2     SET URGLIMIT = NEGMAX FOR ONLY
0107  REF  10 LAST 543       21,3556  54 066 0          TS      JRGLIMIT             2 JET RESPONSE
0108  REF   5 LAST 626       21,3557  55'673 0          TS      NJ-J       SET JETS FOR NO OFFSET CORRECTION
0109  REF   5 LAST 626       21,3560  55'672 1          TS      NJ+J
0110  REF   5 LAST 626       21,3561  55'675 0          TS      NJ-V
0111  REF   5 LAST 626       21,3562  55'674 1          TS      NJ+V

0117                         21,3563  0 0006 1          EXTEND
0118  REF   1                21,3564  3 3567 0          DCA     JRGAXADR
0119                         21,3565  52 006 0          DTCB


0120  REF  17 LAST 629                    E6           EBANK=  OMEGAQ
0121                         21,3566  03154 1  JRGAXADR 2CADR   JRGPLANE
C0121 REF   2 LAST 539       21,3567  36066 1
0122                         21,3570  00016 0  ACONST   DCTAL   00016
0124                         21,3571  77511 1  NEGD     DEC     -0.0111
0125  REF   1                21,3572  03730 0  RESADR   REMADR  JETSON     JETSON IS IN Q,R TJETLAW
```

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P01251 THE TRYGTS CODING IS AN EXTENSION OF THE P,R-AXES REACTION CONTROL SYSTEM AUTOPILOT. TRYGTS CALLS UPON THE GTS
R01253 CODING WHENEVER P,R-AXIS CONTROL FINDS ITSELF ENTERING A COAST REGION WITH JETS OFF.

```
0126   REF  29 LAST 629                          E6              EBANK= DT
0127   REF   6 LAST 533   21,3573  3 7762 0  TRYGTS  CAF     JSERJTS    IS JET USE MANDATORY.
0128   REF  52 LAST 620   21,3574  7 0077 0          MASK    DAPBOOLS
0129   REF 280 LAST 630   21,3575  10 000 0          CCS     A
0130   REF  45 LAST 599   21,3576  1 5733 1          TCF     RESJME     YES.  RESUME.

0132                      21,3577  0 0006 1          EXTEND             NO.  CALL IN GTS, IF POSSIBLE.
0133                      21,3600  00 012 1          READ    12
0134   REF   1            21,3601  7 3617 0          MASK    BGIM21     ARE GIMBALS STILL DRIVING.
0135   REF 281 LAST 632   21,3602  10 000 0          CCS     A
0137   REF  46 LAST 632   21,3603  1 5733 1          TCF     RESJME     GIMBALS STILL DRIVING.  TRY AGAIN LATER.

0138   REF  31 LAST 621   21,3604  4 6311 0  GOTOGTS CS      THREE      GIMBALS STOPPED.  RESET TIME5 COUNTER
0139   REF  16 LAST 591   21,3605  26 030 0          ADS     TIME5      FROM 20 MS TO 50 MS.
0140                      21,3606  0 0006 1          EXTEND             NEXT T5RUPT IN 50 MS IS PAXIS.
0141   REF   4 LAST 580   21,3607  3 2100 1          DCA     PAX/FILT
0143   REF  21 LAST 593   21,3610  53'001 0          DXCH    T5ADR

0144   REF   1            21,3611  1 3404 0  INSRT21A TCF    TESTCNTR   DETERMINE WHAT TO PUT IN PASSCTR.
0145   REF   2 LAST 594   21,3612  55'736 0  LOADCNTR TS     PASSCTR    NMBR PASSES REQUIRED TO WARM UP FILTER
0146                      21,3613  0 0006 1          EXTEND
0147   REF   1            21,3614  3 3621 1          DCA     RATEINAD   NEXT T5RUPT AFTER NEXT PAXIS IS RATEINIT
0148   REF   5 LAST 594   21,3615  53'573 0          DXCH    PFILTADR   CONTROL FLOW SWITCH CELL FOR PAXIS RUPT.
0149   REF  47 LAST 632   21,3616  1 5733 1          TCF     RESJME

01495                     21,3617   07400 1  BGIM21  DCT     07400      TRIM GIMBAL BITS IN CHANNEL 12 ARE 9-12.
0150   REF  30 LAST 632                E6              EBANK= DT
0151                      21,3620   03622 1  RATEINAD 2CADR  RATEINIT   RATE INITIALIZATION FOR KALMAN FILTER.
C0151  REF   1            21,3621   42066 1
```

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P01515

```
0152  REF   1                 21,3622  3 3645 0  RATEINIT CAF    FILTMS50        RESET TIMER IMMEDIATELY  DT = 50 MS.
0153  REF  17 LAST 632        21,3623  54 030 0           TS     TIME5
0154  REF  20 LAST 591        21,3624  22 016 0           LXCH   BANKRUPT        INTERRUPT LEAD-IN (CONTINUED)
0155                          21,3625  0 0006 1           EXTEND
0156  REF  18 LAST 591        21,3626  22 012 1           QXCH   QRUPT
0157                          21,3627  0 0006 1           EXTEND                 FILTINIT WILL BE NEXT T5RUPT, IN 50 MS.
0158  REF   1                 21,3630  3 3644 1           DCA    FILINADR
0159  REF  22 LAST 632        21,3631  53001 0            DXCH   T5ADR
0160  REF   1                 21,3632  3 3635 1           CA     BACKHOME        ESTABLISH RETURN SWITCH FROM THE PROCESS
0161  REF   4 LAST 580        21,3633  55544 1            TS     STEERADR        OF READING CDUY,Z AND TIMER.  TO BE USED
0162  REF   1                 21,3634  1 2042 1           TCF    FILSTART +1     IN FILTINIT FOR RATE INITIALIZATION
0163  REF   2 LAST 633        21,3635  03636 1  BACKHOME  GENADR  BACKHOME +1
0164  REF   4 LAST 580        21,3636  23543 1            LXCH   DAPTIME         RETURN HERE TO STORE DATA JUST DESCRIBED
0165                          21,3637  0 0006 1           EXTEND
0166  REF   8 LAST 598        21,3640  3 1541 0           DCA    STORCDUY        IN 2S COMPLEMENT, SCALED AT PI
0167  REF   2 LAST  56        21,3641  53741 0            DXCH   HOLDCDUY        HOLD FOR RATE DERIVATION
0168  REF  48 LAST 632        21,3642  1 5733 1           TCF    RESUME
0169  REF  31 LAST 632                        E6          EBANK= DT
0170                          21,3643  02000 0  FILINADR 2CADR  FILTINIT
C0170 REF   1                 21,3644  42066 1
0171                          21,3645  37773 0  FILTMS50  DCT    37773           50 MS CONSTANT FOR TIME5
0172  REF   1                 21,3646  03647 1  HOMAGAIN  GENADR  HOMAGAIN +1
0173  REF  46 LAST 602        21,3647  3 7763 1           CA     BIT1            SET UP RATE CALCULATION LOOP, Z AXIS 1ST
0174  REF  30 LAST 598        21,3650  54 066 0  HOMELOOP TS     QRCNTR
0175                          21,3651  6 0000 1           DOUBLE
0176  REF   7 LAST 597        21,3652  54 061 1           TS     KCENTRAL
0177  REF  31 LAST 633        21,3653  50 066 1           INDEX  QRCNTR
0178  REF   9 LAST 633        21,3654  3 1540 1           CA     STORCDUY        2S COMPLEMENT AT PI
0179                          21,3655  0 0006 1           EXTEND
0180  REF  32 LAST 633        21,3656  5 0066 1           INDEX  QRCNTR
0181  REF   3 LAST 633        21,3657  21740 1            MSU    HOLDCDUY        DIFFERENCE IN 1S COMPLEMENT, AT PI
0182                          21,3660  0 0006 1           EXTEND
0183  REF  40 LAST 596        21,3661  7 7756 0           MP     BIT6            DIFFERENCE IN L, AT PI/2(5)
0184  REF 135 LAST 607        21,3662  56 001 0           XCH    L               ZERO L, PREPARE FOR DIVISION BY DT
0185                          21,3663  0 0006 1           EXTEND
0186  REF  32 LAST 633        21,3664  11542 1            DV     DT              DT IS AT 1/8, SO RATE IS AT PI/4
0187  REF   8 LAST 633        21,3665  50 061 0           INDEX  KCENTRAL
0188  REF   6 LAST 592        21,3666  53560 1            DXCH   DCDUYFIL        STORE S.P. INITIAL RATE ESTIMATE
0189  REF  33 LAST 633        21,3667  10 066 0           CCS    QRCNTR          ARE BOTH RATES DONE YET.
0190  REF   1                 21,3670  1 3650 0           TCF    HOMELOOP        NO.   NOW DO Y AXIS
0191  REF   1                 21,3671  3 3674 1           CA     ORDINARY        YES.  SET SWITCH FOR NORMAL OPERATION
```

L SPS BACK-UP RCS CONTROL USER'S OWN PAGE NO. 6 S3 E6

```
0192  REF   1              21,3672  55'742 0          TS      STEERAD2
0193  REF   2 LAST 574     21,3673  1 2323 0          TCF     FILFIRST +1
0194  REF   5 LAST 632     21,3674   02075 1 ORDINARY GENADR   PAX/FILT -2

0195  REF 210 LAST 631     21,3675  3 7767 0 CLEARCHS CAF     ZERO      TURN OFF Q,R-AXES RCS JETS.
0196                       21,3676  0 0006 1          EXTEND
0197                       21,3677  01 005 0          WRITE   5
0198  REF   2 LAST 633     21,3700  3 3646 0          CAF     HOMAGAIN  SET UP TO PREVENT FILTERING DURING THE
0199  REF   2 LAST 634     21,3701  55'742 0          TS      STEERAD2  INITIALIZATION.
0200  REF   2 LAST 633     21,3702  1 2042 1          TCF     FILSTART +1  T6JOBCHK NOT NEEDED.  CHANNEL 5 ZEROED.

0201  REF  10 LAST 580     21,3703  53'575 0 COUNTDWN DXCH    PFRPTLST  FINISH CYCLING POST RUPT LIST.

0202  REF   3 LAST 632     21,3704  11'736 0          CCS     PASSCTR   DECREMENT PASSCTR.
0203  REF   4 LAST 634     21,3705  55'736 0          TS      PASSCTR
0204  REF   3 LAST 634     21,3706  1 2041 1          TCF     FILSTART

0205  REF  33 LAST 633     21,3707  55'542 1 TIMEDONE TS      DT        DT STORED.  SCALED AT 1/8.
0206  REF   3 LAST 634     21,3710  0 1742 1          TC      STEERAD2  BYPASS FILTERING DURING INITIALIZATION.
0207  REF   6 LAST 634     21,3711  1 2075 0          TCF     PAX/FILT -2

0208  REF   1              21,3712  3 3720 1 USUALXIT CA      GOQADR
0209  REF   2 LAST 598     21,3713  55'737 1          TS      SLECTLAW  SET LOOP EXIT FOR SIMPLE CONTROL OR NOT.
0210  REF   1              21,3714  1 3005 0          TCF     GTSQAXIS

0211  REF   5 LAST 634     21,3715  11'736 0 TESTPCTR CCS     PASSCTR   EITHER ZERO (+) , OR POSITIVE
0212  REF   1              21,3716  1 3722 1          TCF     SIMPCTRL  USE SIMPLE CONTROL - NULLIFY ALPHA.
0213  REF   2 LAST 593     21,3717  1 2731 1          TCF     RCSCNTRL  TO TO Q,R JETS.

0214  REF   1              21,3720   03003 1 GOQADR   GENADR   GOQTRIMG
0215  REF   1              21,3721   03726 1 SIMPQADR GENADR   SIMPQTRG

0216  REF   1              21,3722  3 3721 0 SIMPCTRL CA      SIMPQADR  SET UP 2ND PASS THROUGH CONTROL LOOP.
0217  REF   3 LAST 634     21,3723  55'737 1          TS      SLECTLAW
0218  REF  32 LAST 621     21,3724  3 7762 0          CAF     TWO       SET UP INDEX FOR 1ST PASS THROUGH SIM
0219  REF   1              21,3725  1 3727 1          TCF     SIMPLOOP  PLE CONTROL LAW.  (R-AXIS)
0220  REF 211 LAST 634     21,3726  3 7767 0 SIMPQTRG CAF     ZERO      SET INDEX FOR Q-AXIS
0221  REF  34 LAST 633     21,3727  54 066 0 SIMPLOOP TS      QRCNTR
0222  REF  35 LAST 634     21,3730  50 066 1          INDEX   QRCNTR
0223  REF   7 LAST 602     21,3731  11'417 0          CCS     ALPHAQ    CHOOSE DRIVE TO NULL ALPHA
0224  REF  47 LAST 633     21,3732  3 7763 1          CA      BIT1
0225  REF   2 LAST 598     21,3733  1 3176 0          TCF     POSDRIVE
0226  REF  48 LAST 634     21,3734  4 7763 0          CS      BIT1
0227  REF   3 LAST 634     21,3735  1 3176 0          TCF     POSDRIVE  DRIVE BITS GO TO THE CHANNEL
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L SPS BACK-UP RCS CONTROL USER'S OWN PAGE NO. 7 53 E6

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P02285  START CODING FOR MODULE 3 REMAKE, AUGUST 1967***START CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

R0229   FROM GTS: WHEN TRIMCNTR ACTIVE, DO SIMPCTRL IF THE FILTER IS NOT WARM
R0230             AND DO A TGOFF DRIVE IF IT IS.

 0231   REF   5 LAST 603    21,3736  11'764 1  CHKCNTR  CCS    SIMPCNTR    CHOOSE SIMPCTRL OR NORMAL GTS CONTROL.
 0232   REF   3 LAST 593    21,3737  1 3715 0           TCF    TESTPCTR    SIMPCTRL UNTIL PASSCTR IS ZERO,THEN EXIT
 0233   REF   1             21,3740  1 3743 0           TCF    NORMCTRL    NORMAL GTS CONTROL.
 0234   REF  37 LAST 625    21,3741  0 4736 1           TC     CCSHOLE
 0235   REF  38 LAST 635    21,3742  0 4736 1           TC     CCSHOLE

 0236   REF  49 LAST 634    21,3743  3 7763 1  NORMCTRL CAF    BIT1        RETURN TO NORMAL GTS CONTROL.
 0237   REF   1             21,3744  1 2701 1           TCF    INSERT21 +1

R0238   FROM CHEKDRIV: ALLOW TGOFFCAL DRIVES AND DISABLE SPECIAL GTS INDICATORS

 0239   REF   1             21,3745  0 3307 0  WARMFILT TC     TGOFFCAL    (A= 0, INDEX FOR Q-AXIS IN TGOFFCAL)
 0240   REF  12 LAST 586    21,3746  3 7745 0           CAF    NEGMAX      RETURN HERE FOR NO Q DRIVE.
 0241   REF  24 LAST 631    21,3747  54 063 0           TS     ITEMP3      RETURN HERE WITH TIME IN A (DECASECONDS)

 0242   REF  93 LAST 634    21,3750  3 7762 0           CAF    TWO         INDEX FOR R-AXIS.
 0243   REF   2 LAST 635    21,3751  0 3307 0           TC     TGOFFCAL
 0244   REF  13 LAST 635    21,3752  3 7745 0           CAF    NEGMAX      RETURN HERE FOR NO R DRIVE.
 0245   REF 136 LAST 633    21,3753  54 001 1           TS     L           RETURN HERE WITH TIME IN A (DECASECONDS)
02455   REF  25 LAST 635    21,3754  30 063 1           CAE    ITEMP3
 0246   REF   8 LAST 521    21,3755  53,754 1           DXCH   DGIMTIMR    SET TIMERS SIMULTANEOUSLY FOR RESTART
A0247                                                                       PROTECTION.
 0251   REF   5 LAST 599    21,3756  0 3243 1           TC     WRCHN12     START DRIVES

 0252   REF   7 LAST 628    21,3757  11'744 0           CCS    TRIMCNTR    DEACTIVATE TRIMCNTR IF IT HAS REACHED -0
 0253                        21,3760  1 3765 1           TCF    +5
 0254   REF  39 LAST 635    21,3761  0 4736 1           TC     CCSHOLE
 0255                        21,3762  1 3765 1           TCF    +3
 0256   REF  14 LAST 635    21,3763  3 7745 0           CAF    NEGMAX
 0257   REF   8 LAST 635    21,3764  55'744 0           TS     TRIMCNTR
 0258   REF 212 LAST 634    21,3765  3 7767 0  +5       CAF    ZERO        DEACTIVATE GTSMNITR NOW THAT TGOFFCAL
 0259   REF   4 LAST 586    21,3766  55'745 1           TS     GTSMNITR      HAS BEEN DONE
 0260   REF  59 LAST 611    21,3767  1 5727 1           TCF    TASKOVER

R0261   **END CODING FOR MODULE 3 REMAKE, AUGUST 1967*****END CODING FOR MODULE 3 REMAKE, AUGUST 1967*******************

 0262                       21,3770   37777 1  CHKSUM21 OCT    37777
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L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 1 53

P0001 BLOCK 2 LGC ATTITUDE MANEUVER ROUTINE-KALCMANU

R00015 MOD 1 DATE 11/7/66 BY DON FENE
R0002 PROGRAM DESCRIPTION

R0003 KALCMANU IS A ROUTINE WHICH GENERATES COMMANDS FOR THE IM DAP TO CHANGE THE ATTITUDE OF THE SPACECRAFT
R0005 DURING FREE FALL. IT IS DESIGNED TO MANEUVER THE SPACECRAFT FROM ITS INITIAL ORIENTATION TO SOME DESIRED
R0007 ORIENTATION SPECIFIED BY THE PROGRAM WHICH CALLS KALCMANU, AVOIDING GIMBAL LOCK IN THE PROCESS. IN THE
R0009 MOD 1 VERSION, THIS DESIRED ATTITUDE CAN BE SPECIFIED IN ONE OF TWO WAYS

R0010 A) BY A SET OF THREE COMMANDED CDU ANGLES

R0011 B) BY A VECTOR IN STABLE MEMBER COORDINATES ALONG WHICH THE THRUST VECTOR (GIVEN IN SPACECRAFT
R0013 COORDINATES IS TO BE ALIGNED.

R0014 IF THE FIRST METHOD IS USED, THE THREE DESIRED CDU ANGLES MUST BE STORED AS 2'S COMPLEMENT SINGLE
R0016 PRECISION ANGLES IN THE THREE CONSECUTIVE LOCATIONS, CPHI, CTHETA, CPSI, WHERE

R0018 CPHI = COMMANDED OUTER GIMBAL ANGLE
R0019 CTHETA = COMMANDED INNER GIMBAL ANGLE
R0020 CPSI = COMMANDED MIDDLE GIMBAL ANGLE

R0021 THE ENTRY POINT IN KALCMANU FOR THIS METHOD IS KALCMAN3 (SEE SECTION 4)

R0022 THE SECOND METHOD MAY BE USED FOR POINTING THE THRUST AXIS OF THE SPACECRAFT. IN THIS CASE THE AXIS TO
R0024 BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN SUCCESSIVE LOCATIONS OF ERASABLE MEMORY
R0026 BEGINNING WITH THE LOCATION CALLED SCAXIS. THE COMPONENTS OF THIS VECTOR ARE GIVEN IN SPACECRAFT COORDINATES.
R0028 THE DIRECTION IN WHICH THIS AXIS IS TO BE POINTED MUST APPEAR AS A HALF UNIT DOUBLE PRECISION VECTOR IN
R0030 SUCCESSIVE LOCATIONS OF ERASABLE MEMORY BEGINNING WITH THE ADDRESS CALLED POINTVSM. THE COMPONENTS OF
R0032 THIS VECTOR ARE GIVEN IN STABLE MEMBER COORDINATES.

R00321
R0033 KALCMANU DETERMINES THE DIRECTION OF THE SINGLE EQUIVALENT ROTATION (COF ALTERNATELY TERMED U) AND THE
R0035 MAGNITUDE OF THE ROTATION (AM) TO BRING THE S/C FROM ITS INITIAL ORIENTATION TO ITS FINAL ORIENTATION.
R0037 THIS DIRECTION REMAINS FIXED BOTH IN INERTIAL COORDINATES AND IN COMMANDED S/C AXES THROUGHOUT THE
R00385
R0039 MANEUVER. ONCE COF AND AM HAVE BEEN DETERMINED, KALCMANU THEN EXAMINES THE MANEUVER TO SEE IF IT WILL BRING
R00405
R0041 THE S/C THROUGH GIMBAL LOCK. IF SO, COF AND AM ARE READJUSTED SO THAT THE S/C WILL JUST SKIM THE GIMBAL
R0043 LOCK ZONE AND ALIGN THE X-AXIS. IN GENERAL A FINAL YAW ABOUT X WILL BE NECESSARY TO COMPLETE THE MANEUVER.
R0045 NEEDLESS TO SAY, NEITHER THE INITIAL NOR THE FINAL ORIENTATION CAN BE IN GIMBAL LOCK.
R00461
R0047 FOR PROPER ATTITUDE CONTROL THE DIGITAL AUTOPILOT MUST BE GIVEN AN ATTITUDE REFERENCE WHICH IT CAN TRACK.
R0049 KALCMANU DOES THIS BY GENERATING A REFERENCE OF DESIRED GIMBAL ANGLES (CDUXD, CDUYD, CDUZD) WHICH ARE UPDATED
R0051 EVERY ONE SECOND DURING THE MANEUVER. TO ACHIEVE A SMOOTHER SEQUENCE OF COMMANDS BETWEEN SUCCESSIVE UPDATES,
R0053 THE PROGRAM ALSO GENERATES A SET OF INCREMENTAL CDU ANGLES (DELDCDU) TO BE ADDED TO CDU DESIRED BY THE DIGITAL
R0055 AUTOPILOT. KALCMANU ALSO CALCULATES THE COMPONENT MANEUVER RATES (OMEGAPD, OMEGAQD, OMEGARD), WHICH CAN
R00565

L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 2 53

R0057 BE DETERMINED SIMPLY BY MULTIPLYING COF BY SOME SCALAR (ARATE) CORRESPONDING TO THE DESIRED ROTATIONAL RATE.
R00581
R0059 AUTOMATIC MANEUVERS ARE TIMED WITH THE HELP OF WAITLIST SO THAT AFTER A SPECIFIED INTERVAL THE Y AND Z
R0061 DESIRED RATES ARE SET TO ZERO AND THE DESIRED CDU ANGLES (CDUYD, CDUZD) ARE SET EQUAL TO THE FINAL DESIRED CDU
R0063 ANGLES (CTHETA, CPSI). IF ANY YAW REMAINS DUE TO GIMBAL LOCK AVOIDANCE, THE FINAL YAW MANEUVER IS
R0065 CALCULATED AND THE DESIRED YAW RATE SET TO SOME FIXED VALUE (ROLLRATE = + OR - 2 DEGREES PER SEC).
R0067 IN THIS CASE ONLY AN INCREMENTIAL CDUX ANGLE (DELFROLL) IS SUPPLIED TO THE DAP. AT THE END OF THE YAW
R0069 MANEUVER OR IN THE EVENT THAT THERE WAS NO FINAL YAW, CDUXD IS SET EQUAL TO CPHI AND THE X-AXIS DESIRED
R0071 RATE SET TO ZERO. THUS, UPON COMPLETION OF THE MANEUVER THE S/C WILL FINISH UP IN A LIMIT CYCLE ABOUT THE
R0073 DESIRED FINAL GIMBAL ANGLES.

R0074 PROGRAM LOGIC FLOW

R0075 CALCMANU IS CALLED AS A HIGH PRIORITY JOB WITH ENTRY POINTS AT KALCMAN3 AND VECPOINT. IT FIRST PICKS
R0077 UP THE CURRENT CDU ANGLES TO BE USED AS THE BASIS FOR ALL COMPUTATIONS INVOLVING THE INITIAL S/C ORIENTATION.
R0079 IT THEN DETERMINES THE DIRECTION COSINE MATRICES RELATING BOTH THE INITIAL AND FINAL S/C ORIENTATION TO STABLE
R00805
R0081 MEMBER AXES (MIS, MFS). IT ALSO COMPUTES THE MATRIX RELATING FINAL S/C AXES TO INITIAL S/C AXES (MFI). THE
R0083 ANGLE OF ROTATION (AM) IS THEN EXTRACTED FROM THIS MATRIX, AND TESTS ARE MADE TO DETERMINE IF
R0084
R0085 A) AM LESS THAN .25 DEGREES (MINANG)
R0086 B) AM GREATER THAN 170 DEGREES (MAXANG)

R0087 IF AM LESS THAN .25 DEGREES, NO COMPLICATED AUTOMATIC MANEUVERING IS NECESSARY. THEREFORE WE CAN SIMPLY
R0089 SET CDU DESIRED EQUAL TO THE FINAL CDU DESIRED ANGLES AND TERMINATE THE JOB.
R00905
R0091 IF AM IS GREATER THAN .25 DEGREES BUT LESS THAN 170 DEGREES, THE AXES OF THE SINGLE EQUIVALENT ROTATION
R00925
R0093 (COF) IS EXTRACTED FROM THE SKEW SYMMETRIC COMPONENTS OF MFI.
R0094 IF AM GREATER THAN 170 DEGREES AN ALTERNATE METHOD EMPLOYING THE SYMMETRIC PART OF MFI (MFISYM) IS USED
R00955
R0096 TO DETERMINE COF.

R0097 THE PROGRAM THEN CHECKS TO SEE IF THE MANEUVER AS COMPUTED WILL BRING THE S/C THROUGH GIMBAL LOCK. IF
R0099 SO, A NEW MANEUVER IS CALCULATED WHICH WILL JUST SKIM THE GIMBAL LOCK ZONE AND ALIGN THE S/C X-AXIS. THIS
R0101 METHOD ASSURES THAT THE ADDITIONAL MANEUVERING TO AVOID GIMBAL LOCK WILL BE KEPT TO A MINIMUM. SINCE A FINAL
R0103 P AXIS YAW WILL BE NECESSARY, A SWITCH IS RESET (STATE SWITCH 31) TO ALLOW FOR THE COMPUTATION OF THIS FINAL
R0105 YAW.

R0106 AS STATED PREVIOUSLY KALCMANU GENERATES A SEQUENCE OF DESIRED GIMBAL ANGLES WHICH ARE UPDATED EVERY
R01072
R0108 SECOND. THIS IS ACCOMPLISHED BY A SMALL ROTATION OF THE DESIRED S/C FRAME ABOUT THE VECTOR COF. THE NEW
R0110 DESIRED REFERENCE MATRIX IS THEN,

R01105
R0111 $MIS_{N+1} = MIS_{N} \; DEL$
R01115

L ATTITJDE MANEUVER ROJTINE USER'S OWN PAGE NO. 3 S3

R01117 *
R0112 WHERE DEL IS THE MATRIX CORRESPONDING TO THIS SMALL ROTATION. THE NEW CDU ANGLES CAN THEN BE EXTRACTED
R01135 *
R0114 FROM MIS.

R0115 AT THE BEGINNING OF THE MANEUVER THE AUTOPILOT DESIRED RATES (OMEGAPD, OMEGAQD, OMEGARD) AND THE
R0117 MANEJVER TIMINGS ARE ESTABLISHED. ON THE FIRST PASS AND ON ALL SUBSEQUENT UPDATES THE CDU DESIRED
R0119 ANGLES ARE LOADED WITH THE APPROPRIATE VALUES AND THE INCREMENTAL CDU ANGLES ARE COMPUTED. THE AGC CLOCKS
R0121 (TIME1 AND TIME2) ARE THAN CHECKED TO SEE IF THE MANEJVER WILL TERMINATE BEFORE THE NEXT UPDATE. IF
R0123 NOT, CALCMANU CALLS FOR ANOTHER UPDATE (RJN AS A JOB WITH PRIORITY TBD) IN ONE SECOND. ANY DELAYS IN THIS
R0125 CALLING SEQUENCE ARE AUTOMATICALLY COMPENSATED IN CALLING FOR THE NEXT UPDATE.
R01265
R0127 IF IT IS FOUND THAT THE MANEUVER IS TO TERMINATE BEFORE THE NEXT UPDATE A ROUTINE IS CALLED (AS A WAIT-
R0129 LIST TASK) TO STOP THE MANEUVER AT THE APPROPRIATE TIME AS EXPLAINED ABOVE.
R0131

R0132 CALLING SEQUENCE

R0133 THE ENTRY POINT IN KALCMANU FOR POINTING THE THRJST AXIS OF THE SPACECRAFT IS VECPOINT
R01345
R0135 CAF PRIO XX
R01355 --
R0136 INHINT
R0137 TC FINDVAC
R0138 2CADR VECPOINT
R0139 RELINT

R0140 THE CALLING PROGRAM MUST ALSO SPECIFY THE DESIRED MANEJVERING RATES, PRESENTLY IN THE FORM OF A SINGLE
R0142 PRECISION NUMBER (RATEINDEX), WHICH IS LOADED WITH ONE OF FOUR VALUES 0, 2, 4, OR 6, CORRESPONDING TO ANGULAR
R0144 RATES OF .5, 2, 5, 10 DEGREES/SEC. THERE IS ALSO A STATE SWITCH (33) WHICH MAY BE SET TO IGNORE ANY FINAL YAW
R0146 INCURRED BY AVOIDING GIMBAL LOCK.

R0147 WITH THIS INFORMATION KALCMANU WILL THEN GENERATE A SEQUENCE OF THREE CDU DESIRED ANGLES (CDUXD, CDUYD,
R0149 CDUZD), AND THREE INCREMENTAL ANGLES (DELJCDU, DELDCDJ1, DELDCDU2) AS WELL AS THE COMPONENT MANEUVER RATES
R0151 (IN S/C AXES) TO BE JSED BY THE LEM DAP IN PERFORMING THE AJTOMATIC MANEUVER.
R01525
R0153 THERE ARE TWO WAYS IN WHICH KALCMANJ MAY BE INITIATED CORRESPONDING TO THE TWO METHODS OF SPECIFYING THE
R0155 DESIRED ATTITUDE OF THE SPACECRAFT. IF METHOD 1 IS USED, THE COMMANDED GIMBAL ANGLES MUST BE PRECOMPUTED AND
R0157 STORED IN LOCATIONS CPHI, CTHETA, CPSI. THE USER:S PROGRAM MUST THEN CLEAR STATE SWITCH NO 33 TO ALLOW THE
R0159 ATTITJDE MANEUVER ROJTINE TO PERFORM ANY FINAL P-AXIS YAW INCURRED BY AVOIDING GIMBAL LOCK. THE MANEUVER IS
R0161 THEN INITIATED BY ESTABLISHING THE FOLLOWING EXECJTIVE JOB

R01615 *
R0162 CAF PRIO XX
R01625 --
R0163 INHINT
R0164 TC FINDVAC
R0165 2CADR KALCMAN3
R0166 RELINT

L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 4 S3

R0167 THE USER'S PROGRAM MAY EITHER CONTINUE OR WAIT FOR THE TERMINATION OF THE MANEUVER. IF THE USER WISHES TO
R0169 WAIT, HE MAY PUT HIS JOB TO SLEEP WITH THE FOLLOWING INSTRUCTIONS

```
R0171          -        TC        BANKCALL
R0172          L+1      CADR      ATTSTALL
R0173          L+2      (BAD      RETURN)
R0174          L+3      (GOOD)    RETURN)
```

R0175 UPON COMPLETION OF THE MANEUVER, THE PROGRAM WILL BE AWAKENED AT L+3 IF THE MANEUVER WAS COMPLETED
R0177 SUCCESSFULLY, OR AT L+2 IF THE MANEUVER WAS ABORTED. THIS ABORT WOULD OCCUR IF THE INITIAL OR FINAL ATTITUDE
R0179 WAS IN GIMBAL LOCK.

R01795
R0180 IF THE SECOND METHOD IS USED, THE DESIRED THRUST DIRECTION, $\bar{V}_F$, MUST BE COMPUTED AND STORED IN THE SIX
R01815
R0182 ERASABLE LOCATIONS BEGINNING WITH THE ADDRESS POINTVSM. THE THRUST AXIS MUST BE LOADED INTO THE SIX ERASABLE
R0184 LOCATIONS BEGINNING WITH SC AXIS. THE CALLER MUST THEN CLEAR (OR SET) STATE SWITCH NO 33 AND SPECIFY THE
R0186 DESIRED MANEUVERING RATE AS BEFORE. THE MANEUVER IS THEN INITIATED BY THE EXECUTIVE CALL.
R0188

R0189 SUBROUTINES

R0190 CALCMANU USES A NUMBER OF INTERPRETIVE SUBROUTINES WHICH MAY BE OF GENERAL INTEREST. SINCE THESE ROUTINES
R0192 WERE PROGRAMMED EXCLUSIVELY FOR CALCMANU, THEY ARE NOT, AS YET, GENERALLY AVAILABLE FOR USE BY OTHER PROGRAMS.
R0194
R0195 MXM3
R01955 ----

R0196 THIS SUBROUTINE MULTIPLIES TWO 3X3 MATRICES AND LEAVES THE RESULT IN THE FIRST 18 LOCATIONS OF THE PUSH
R0198 DOWN LIST, I.E.,

$$
\begin{matrix} * \\ M \end{matrix} = \begin{pmatrix} M & M & M \\ 0 & 1 & 2 \\ M & M & M \\ 3 & 4 & 5 \\ M & M & M \\ 6 & 7 & 8 \end{pmatrix} = M1 \times M2
$$

R0199
R01992
R01994
R0200
R02005
R02006
R0201
R02015

R02018
R0202 INDEX REGISTER X1 MUST BE LOADED WITH THE COMPLEMENT OF THE STARTING ADDRESS FOR $M1^*$, AND X2 MUST BE
R02035
R0204 LOADED WITH THE COMPLEMENT OF THE STARTING ADDRESS FOR $M2^*$. THE ROUTINE USES THE FIRST 20 LOCATIONS OF THE PUSH
R0206 DOWN LIST. THE FIRST ELEMENT OF THE MATRIX APPEARS IN PDO. PUSH UP FOR M_8.
R02075
R0208

R0209 TRANSPOS
R02095 --------

L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 5 53

R0210 THIS ROUTINE TRANSPOSES A 3X3 MATRIX AND LEAVES THE RESULT IN THE PUSH DOWN LIST. I.E.,
R0212
R02124 * * T
R0213 M = M1

R0214 INDEX REGISTER X_1 MUST CONTAIN THE COMPLEMENT OF THE STARTING ADDRESS FOR M1. PUSH UP FOR THE FIRST AND SUB-
R02155 *
R0216 SEQUENT COMPONENTS OF M. THIS SUBROUTINE ALSO USES THE FIRST 20 LOCATIONS OF THE PUSH DOWN LIST.
R0218
R0219 CDU TO DCM
R02195 ----------

R0220 THIS SUBROUTINE CONVERTS THREE CDU ANGLES IN T(MPAC) TO A DIRECTION COSINE MATRIX (SCALED BY 2) RELATING
R0222 THE CORRESPONDING S/C ORIENTATIONS TO THE STABLE MEMBER FRAME. THE FORMULAS FOR THIS CONVERSION ARE
R0224
R0225 M = COSY COSZ
R02255 0

R0226 M = -COSY SINZ COSX + SINY SINX
R02265 1

R0227 M = COSY SINZ SINX + SINY COSX
R02275 2

R0228 M = SINZ
R02285 3

R0229 M = COSZ COSX
R02295 4

R0230 M = -COSZ SINX
R02305 5

R0231 M = -SINY COSZ
R02315 6

R0232 M = SINY SINZ COSX + COSY SINX
R02325 7

R0233 M = -SINY SINZ SINX + COSY COSX
R02335 8

R0234 WHERE X = OUTER GIMBAL ANGLE
R0235 Y = INNER GIMBAL ANGLE
R0236 Z = MIDDLE GIMBAL ANGLE

R0237 THE INTERPRETATION OF THIS MATRIX IS AS FOLLOWS

R0238 IF A_X, A_Y, A_Z REPRESENT THE COMPONENTS OF A VECTOR IN S/C AXES THEN THE COMPONENTS OF THE SAME VECTOR IN
R0240

L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 6 53

```
R0241   STABLE MEMBER AXES (B , B , B ) ARE
R0242                       X   Y   Z

R0243             (B )                (A )
R0244             ( X)                ( X)
R02445            (  )                (  )
R0245             (  )          *     (  )
R0246             (B )     =    M     (A )
R0247             ( Y)                ( Y)
R02475            (  )                (  )
R0248             (B )                (A )
R0249             ( Z)                ( Z)
```

R0250 THE SUBROUTINE WILL STORE THIS MATRIX IN SEQUENTIAL LOCATIONS OF ERASABLE MEMORY AS SPECIFIED BY THE CALLING
R02515 *
R0252 PROGRAM. TO DO THIS THE CALLING PROGRAM MUST FIRST LOAD X_2 WITH THE COMPLEMENT OF THE STARTING ADDRESS FOR M.
R0255
R0256 INTERNALLY, THE ROUTINE USES THE FIRST 16 LOCATIONS OF THE PUSH DOWN LIST, ALSO STEP REGISTER S1 AND INDEX
R0258 REGISTER X2.

R0259 DCM TO CDU
R0260 ----------
R0261
R0262 THIS ROUTINE EXTRACTS THE CDU ANGLES FROM A DIRECTION COSINE MATRIX (M SCALED BY 2) RELATING S/C AXIS TO
R0264 *
R0265 STABLE MEMBER AXES. X1 MUST CONTAIN THE COMPLEMENT OF THE STARTING ADDRESS FOR M. THE SUBROUTINE LEAVES THE
R0267 CORRESPONDING GIMBAL ANGLES IN V(MPAC) AS DOUBLE PRECISION 1:S COMPLEMENT ANGLES SCALED BY 2PI. THE FORMULAS
R0269 FOR THIS CONVERSION ARE

```
R0270        Z    =    ARCSIN (M )
R0271                          3

R0272        Y    =    ARCSIN (-M /COSZ)
R0273                          6
```

R0274 IF M IS NEGATIVE, Y IS REPLACED BY PI SGN Y - Y
R0275 0

```
R0276        X    =    ARCSIN (-M /COSZ)
R0277                          5
```

R0278 IF M IS NEGATIVE X IS REPLACED BY PI SGN X - X
R02785 4

R0279 THIS ROUTINE DOES NOT SET THE PUSH DOWN POINTER, BUT USES THE NEXT 8 LOCATIONS OF THE PUSH DOWN LIST AND
R0281 RETURNS THE POINTER TO ITS ORIGINAL SETTING. THIS PROCEDURE ALLOWS THE CALLER TO STORE THE MATRIX AT THE TOP OF
R0283 THE PUSH DOWN LIST.

L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 7 S3

R0284 DELCOMP
R0285 -------

R0286
R0287 THIS ROUTINE COMPUTES THE DIRECTION COSINE MATRIX (DEL) RELATING ON
R0289
R0290 IS ROTATED WITH RESPECT TO THE FIRST BY AN ANGLE, A, ABOUT A UNIT VECTOR, U. THE FORMULA FOR THIS MATRIX IS
R0292
R0293
R0294 DEL = I COSA + UU (1-COSA) + V SINA
R0295 X

R0296 WHERE
R0297 I =
R0298

R0299
R0300
R0301
R03015
R0302 --T
R0303 UU =
R0304
R03045
R0305
R0306
R0307

R0308
R0309
R0310
R0311 V =
R0312 X
R03125
R0313
R0314

R0315
R0316 U = UNIT ROTATION VECTOR RESOLVED INTO S/C AXES
R0317 A = ROTATION ANGLE

R0318
R0319 THE INTERPRETATION OF DEL IS AS FOLLOWS

R0320 IF A , A , A REPRESENT THE COMPONENT OF A VECTOR IN THE ROTATED FRAME, THEN THE COMPONENTS OF THE SAME
R0322 X Y Z
R0323 VECTOR IN THE ORIGINAL S/C AXES (B , B , B) ARE
R0324 X Y Z

L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 8 S3

```
R0325            (B )                (A )
R0326            ( X)                ( X)
R0327            (  )        *       (  )
R0328            (B )    =   DEL     (A )
R0329            ( Y)                ( Y)
R03295           (  )                (  )
R0330            (B )                (A )
R0331            ( Z)                ( Z)
```

R0332 THE ROUTINE WILL STORE THIS MATRIX (SCALED UNITY) IN SEQUENTIAL LOCATIONS OF ERASABLE MEMORY BEGINNING WITH
R03335
R0334 THE LOCATION CALLED DEL. IN ORDER TO USE THE ROUTINE, THE CALLING PROGRAM MUST FIRST STORE U (A HALF UNIT
R0337 DOUBLE PRECISION VECTOR) IN THE SET OF ERASABLE LOCATIONS BEGINNING WITH THE ADDRESS CALLED COF. THE ANGLE, A,
R0339 MUST THEN BE LOADED INTO D(MPAC).

R0340 INTERNALLY, THE PROGRAM ALSO USES THE FIRST 10 LOCATIONS OF THE PUSH DOWN LIST.
R0342

R0343 READCDUK
R0344 --------

R0345 THIS BASIC LANGUAGE SUBROUTINE LOADS T(MPAC) WITH THE THREE CDU ANGLES.
R0347

R0348 SIGNMPAC
R0349 --------

R0350 THIS IS A BASIC LANGUAGE SUBROUTINE WHICH LIMITS THE MAGNITUDE OF D(MPAC) TO + OR - DPOSMAX ON OVERFLOW.
R0352

R0353 PROGRAM STORAGE ALLOCATION

R0354	1)	FIXED MEMORY	1059 WORDS
R0355	2)	ERASABLE MEMORY	98
R0356	3)	STATE SWITCHES	3
R0357	4)	FLAGS	1

R0358 JOB PRIORITIES

R0359	1)	KALCMANU	TBD
R0360	2)	ONE SECOND UPDATE	TBD

R0361 SUMMARY OF STATE SWITCHES AND FLAGWORDS USED BY KALCMANU.

L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 9 S3

	STATE SWITCH NO.	FLAGWRD 2 BIT NO.	SETTING	MEANING
R0364	*			
R0365	31	14	0	MANEUVER WENT THROUGH GIMBAL LOCK
R0367			1	MANEUVER DID NOT GO THROUGH GIMBAL LOCK
R0369				
R0370	*			
R0371	32	13	0	CONTINUE UPDATE PROCESS
R0372			1	START UPDATE PROCESS
R0373	33	12	0	PERFORM FINAL P-AXIS YAW IF REQUIRED
R0375			1	IGNORE ANY FINAL P-AXIS YAW
R0377				
R0378	34	11	0	SIGNAL END OF KALCMANU
R0379			1	KALCMANU IN PROCESS USER MUST SET SWITCH BEFORE INITIATING

R0382 * INTERNAL TO KALCMANU

R0383 SUGGESTIONS FOR PROGRAM INTEGRATION

R0384 THE FOLLOWING VARIABLES SHOULD BE ASSIGNED TO UNSWITCH ERASABLE

R0385 CPHI
R0386 CTHETA
R0387 CPSI
R0388 POINTVSM +5
R0389 SCAXIS +5
R0390 DELDCDU
R0391 DELDCDU1
R0392 DELDCDU2
R03925 RATEINDX

R0393 THE FOLLOWING SUBROUTINES MAY BE PUT IN A DIFFERENT BANK

R0394 MXM3
R0395 TRANSPOS
R0396 SIGNMPAC
R0397 READCDUK
R0398 CDUTODCM

L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 10 S3

```
10174                                  34,2000          BANK    34
10175  REF   1                                 E3       EBANK=  MIS
10176                                  34,2000  1 2001 0 NOOP
1018   REF   53 LAST 465              34,2001  0 6112 0 VECPOINT TC     INTPRET
1019                                   34,2002  77634 0  RTB
1020   REF   1                        34,2003  73513 1          READCDUK        READ THE PRESENT CDU ANGLES
1021   REF   1                        34,2004  01533 0  STORE   BCDU
1022                                   34,2005  45164 0  AXC,2   CALL            COMPUTE THE TRANSFORMATION FROM INITIAL
1023   REF   2 LAST 645               34,2006  01535 0          MIS             S/C AXES TO STABLE MEMBER AXES (MIS)
1024   REF   1                        34,2007  70445 0          CDUTRNDCM
1025                                   34,2010  61375 1  VLOAD   VXM
1026   REF   1                        34,2011  01656 0          POINTVSM        RESOLVE THE POINTING DIRECTION VS INTO
1027   REF   3 LAST 645               34,2012  01536 0          MIS             INITIAL S/C AXES
1028                                   34,2013  41456 0  UNIT    PUSH
1029                                   34,2014  53435 0  VXV     UNIT            TAKE THE CROSS PRODUCT VF X VI
1030   REF   1                        34,2015  01664 1          SCAXIS          WHERE VI = SCAXIS
10305                                  34,2016  57400 1  BOV     VCOMP
1031   REF   1                        34,2017  70042 0          PICKAXIS
1032   REF   1                        34,2020  25624 0  STODL   COF
1033   REF   2 LAST 645               34,2021  01664 1          SCAXIS
1034                                   34,2022  72441 0  DOT     SL1
1035                                   34,2023  77726 1  ARCCOS
1036                                   34,2024  77624 1  COMPMATX CALL            NOW COMPUTE THE TRANSFORMATION FROM
1037   REF   1                        34,2025  70564 1          DELCOMP         FINAL S/C AXES TO INITIAL S/C AXES = MFI
1038                                   34,2026  75160 1  AXC,1   AXC,2           COMPUTE THE TRANSFORMATION FROM FINAL
1039   REF   4 LAST 645               34,2027  01535 0          MIS             S/C AXES TO STABLE MEMBER AXES
1040   REF   1                        34,2030  01557 1          XEL
1041                                   34,2031  77624 1  CALL
1042   REF   1                        34,2032  73417 1          MXM3            MFS IN PD LIST
1043                                   34,2033  45160 1  AXC,1   CALL
1044                                   34,2034  00000 1          0               EXTRACT THE CDU ANGLES FROM THIS MATRIX
1045   REF   1                        34,2035  70711 1          DCMTRNCDU
1046                                   34,2036  77634 0  RTB
1047   REF   2 LAST 347               34,2037  33526 0          VISTO2S         AND USE THEM AS THE COMMANDED CDU ANGLES
1048   REF   1                        34,2040  35632 0  STCALL  CPHI
1049   REF   1                        34,2041  70070 1          XALCMAN3 +1     PROCEED AS IF WE HAD BEEN GIVEN COMMAND
A1050                                                                           CDU ANGLES
1051                                   34,2042  50375 0  PICKAXIS VLOAD  DOT     IF VF X VI = 0. PUSH UP FOR VF
1052   REF   3 LAST 645               34,2043  01664 1          SCAXIS          FIND VF . VI
1053                                   34,2044  72240 1  BMN     TLOAD           IF ANTIPARALLEL
1054   REF   1                        34,2045  70051 1          ROT180
1055   REF   2 LAST 645               34,2046  01533 0          BCDU
1056   REF   2 LAST 645               34,2047  35632 0  STCALL  CPHI            IF VF = VI
1057   REF   2 LAST 645               34,2050  70070 1          XALCMAN3 +1

1058                                   34,2051  47375 0  ROT180  VLOAD  VXV      180 DEG ROTATION IS REQUIRED
1059   REF   5 LAST 645               34,2052  01544 0          MIS +6          Y STABLE MEMBER AXIS IN INITIAL S/C AXES
1060   REF   1                        34,2053  30414 0          HALFA
1061                                   34,2054  47256 0  UNIT    VXV             FIND Y(SM) X X(I)
1062   REF   4 LAST 645               34,2055  01664 1          SCAXIS          FIND UNIT (VI X UNIT(Y(SM) X X(I)))
```

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```
1063                        34,2056  40056 0              UNIT   BOV          PICK A VECTOR PERPENDICULAR TO VI IN THE
1064   REF   1              34,2057  70064 1                     PICKX        PLANE CONTAINING Y(SM) AND X(I) SO THAT
1065   REF   2 LAST 645     34,2060  15624 0  XROT       STODL  COF          MANEUVER DOES NOT GO THRU GIMBAL LOCK
1066   REF   2 LAST 645     34,2061  30414 0                     HALFA
1067                        34,2062  77650 1              GOTO
1068   REF   1              34,2063  70024 0                     COMPMATX
1069                        34,2064  52175 0  PICKX      VLOAD  GOTO         PICK THE X AXIS IN THIS CASE
10691  REF   3 LAST 646     34,2065  30414 0                     HALFA
10692  REF   1              34,2066  70060 0                     XROT

R10693 FIRST ENTRY POINT= KALCMAN3

R1070  THE THREE DESIRED CDU ANGLES MUST BE STORED AS SINGLE PRECISION TWOS COMPLEMENT ANGLES IN THE THREE SUCCESSIVE
R1072  LOCATIONS, CPHI, CTHETA, CPSI.

1073   REF  54 LAST 645     34,2067  0 6112 0  KALCMAN3 TC     INTPRET      PICK UP THE CURRENT CDU ANGLES AND
1074                        34,2070  77634 0              RTB                   COMPUTE THE MATRIX FROM INITIAL S/C
1076   REF   2 LAST 645     34,2071  73513 1                     READCDUK      AXES TO FINAL S/C AXES
1077   REF   3 LAST 645     34,2072  01533 0              STORE  BCDU         STORE INITIAL S/C ANGLES
1078                        34,2073  51535 0              SLOAD  ABS
1079   REF   4 LAST 646     34,2074  01535 0                     BCDU +2      CHECK MAGNITUDE OF MIDDLE GIMBAL ANGLE
1080                        34,2075  51025 1              DSU    BPL
1081   REF   1              34,2076  30444 0                     LOCKANGL     IF GREATER THAN 60 DEG, ABORT MANEUVER
1082   REF   1              34,2077  70771 1                     TOOBAD
1083                        34,2100  72364 0              AXC,2  TLOAD
1084   REF   6 LAST 645     34,2101  01535 0                     MIS
1085   REF   5 LAST 646     34,2102  01533 0                     BCDU
1086                        34,2103  77624 1              CALL                 COMPUTE THE TRANSFORMATION FROM INITIAL
1087   REF   2 LAST 645     34,2104  70445 0                     CDUTODCM     S/C AXES TO STABLE MEMBER AXES
1088                        34,2105  51535 0              SLOAD  ABS          CHECK THE MAGNITUDE OF THE DESIRED
1089   REF   1              34,2106  01634 1                     CPSI         MIDDLE GIMBAL ANGLE
1090                        34,2107  51025 1              DSU    BPL
1091   REF   2 LAST 646     34,2110  30444 0                     LOCKANGL     IF GREATER THAN 60 DEG, ABORT MANEUVER
1092   REF   2 LAST 646     34,2111  70771 1                     TOOBAD
1141                        34,2112  72364 0              AXC,2  TLOAD
1142   REF   5 LAST  32     34,2113  01557 1                     MFS          PREPARE TO CALCULATE ARRAY MFS
1143   REF   3 LAST 645     34,2114  01632 1                     CPHI
1144                        34,2115  77624 1              CALL
11445  REF   3 LAST 646     34,2116  70445 0                     CDUTODCM
1250                        34,2117  45160 1  SECAD      AXC,1  CALL         MIS AND MFS ARRAYS CALCULATED          $2
12581  REF   7 LAST 646     34,2120  01535 0                     MIS
1259   REF   1              34,2121  73447 1                     TRANSPOS
1260                        34,2122  77775 1              VLOAD
1261                        34,2123  77626 0              STADR
1262   REF  10 LAST  32     34,2124  52161 0              STOVL  TMIS +12D
1263                        34,2125  77626 0              STADR
1264   REF  11 LAST 646     34,2126  52167 0              STOVL  TMIS +6
1265                        34,2127  77626 0              STADR
1266   REF  12 LAST 646     34,2130  76175 0              STORE  TMIS         TMIS = TRANSPOSE(MIS) SCALED BY 2
1267                        34,2131  75160 1              AXC,1  AXC,2
```

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```
 1268   REF  13 LAST 646     34,2132   01601 1              TMIS
 1269   REF   6 LAST 646     34,2133   01557 1              MFS
 12695                       34,2134   77624 1       CALL
 1270   REF   2 LAST 645     34,2135   73417 1              MXM3
 1271                        34,2136   45575 1       VLOAD  STADR
 1273   REF   1              34,2137   52203 1       STOVL  MFI +12D
 1274                        34,2140   77626 0       STADR
 1275   REF   2 LAST 647     34,2141   52211 1       STOVL  MFI +6
 1276                        34,2142   77626 0       STADR
 1277   REF   3 LAST 647     34,2143   76217 1       STORE  MFI            MFI = TMIS MFS (SCALED BY 4)
 1278                        34,2144   45001 1       SETPD  CALL           TRANSPOSE MFI IN PD LIST
 1279                        34,2145   00023 0              18D
 1280   REF   1              34,2146   73456 1              TRNSDSPD
 1281                        34,2147   45575 1       VLOAD  STADR
 1282   REF   1              34,2150   52161 0       STOVL  TMFI +12D
 1283                        34,2151   77626 0       STADR
 1284   REF   2 LAST 647     34,2152   52167 0       STOVL  TMFI +6
 1285                        34,2153   77626 0       STADR
 1286   REF   3 LAST 647     34,2154   76175 0       STORE  TMFI           TMFI = TRANSPOSE (MFI)  SCALED BY 4
R1287
R1288   CALCULATE COFSKEW AND MFISYM
R1289
 1290                        34,2155   45345 1       DLOAD  DSU
 1291   REF   4 LAST 647     34,2156   01604 1              TMFI +2
 1292   REF   4 LAST 647     34,2157   01562 1              MFI +2
 1293                        34,2160   45325 1       PDDL   DSU            CALCULATE COF SCALED BY 2/SIN(AM)
 1294   REF   5 LAST 647     34,2161   01564 1              MFI +4
 1295   REF   5 LAST 647     34,2162   01606 0              TMFI +4
 1296                        34,2163   45325 1       PDDL   DSU
 1297   REF   6 LAST 647     34,2164   01614 0              TMFI +10D
 1298   REF   6 LAST 647     34,2165   01572 0              MFI +10D
 1299                        34,2166   77666 1       VDEF
 1300   REF   3 LAST  32     34,2167   01635 0       STORE  COFSKEW        EQUALS MFISKEW
R130101
R130102 CALCULATE AM AND PROCEED ACCORDING TO ITS MAGNITUDE
R130103
 130104                      34,2170   43345 1       DLOAD  DAD
 130105 REF   7 LAST 647     34,2171   01560 0              MFI
 130106 REF   8 LAST 647     34,2172   01600 0              MFI +16D
 130107                      34,2173   43225 0       DSU    DAD
 130108 REF   1              34,2174   30426 1              QUARTA
 130109 REF   9 LAST 647     34,2175   01570 1              MFI +8D
 13011  REF   2 LAST  32     34,2176   01645 1       STORE  CAM            CAM = (MFI0+MFI4+MFI8-1)/2 HALF SCALE
 130111                      34,2177   77726 1       ARCCOS
 130112 REF   1              34,2200   01643 1       STORE  AM             AM=ARCCOS(CAM)  (AM SCALED BY 2)
 130113                      34,2201   51025 1       DSU    BPL
 130114 REF   1              34,2202   30410 1              MINANG
 130115 REF   1              34,2203   70214 1              CHECKMAX
 13012                       34,2204   77751 1       TLOAD                 MANEUVER LESS THAN .25 DEGREES
 13013  REF   4 LAST 646     34,2205   01632 1              CPHI            GO DIRECTLY INTO ATTITUDE HOLD
```

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```
13014  REF   9 LAST 503    34,2206  00767 1          STORE   CDUXD      ABOUT COMMANDED ANGLES
13015                      34,2207  77751 1          TLOAD
13016  REF   1             34,2210  30416 1                  NIL
13017  REF   7 LAST 509    34,2211  00775 1          STORE   OMEGAPD     ZERO DESIRED RATES
13018  REF   1             34,2212  34772 1          STCALL  DELOCDU     PREPARE TO END MANEUVER ON GOOD RETURN
13019  REF   1             34,2213  70761 0                  ENDMANU
1302                       34,2214  45345 1  CHECKMAX DLOAD   DSU
13021  REF   2 LAST 647    34,2215  01643 1                  AM
13022  REF   1             34,2216  30412 0                  MAXANG
13023                      34,2217  77244 0          BPL     VLOAD
13024  REF   1             34,2220  70226 0                  ALTCALC     UNIT
13025  REF   4 LAST 647    34,2221  01635 0                  COFSKEW     COFSKEW
13026                      34,2222  77656 1          UNIT
13027  REF   3 LAST 646    34,2223  01624 0          STORE   COF         COF IS THE MANEUVER AXIS
13028                      34,2224  77650 1          GOTO                SEE IF MANEUVER GOES THRU GIMBAL LOCK
13029  REF   1             34,2225  71006 1                  LOCSKIRT
1303                       34,2226  53375 0  ALTCALC  VLOAD   VAD         IF AM GREATER THAN 170 DEGREES
13035  REF  10 LAST 647    34,2227  01560 0                  MFI
1304   REF   7 LAST 647    34,2230  01602 1                  TMFI
13045                      34,2231  77762 1          VSR1
1305   REF   1             34,2232  25602 1          STOVL   MFISYM
1306   REF  11 LAST 648    34,2233  01566 0                  MFI +6
1307                       34,2234  74455 0          VAD     VSR1
1308   REF   8 LAST 648    34,2235  01610 1                  TMFI +6
1309   REF   2 LAST 648    34,2236  25610 1          STOVL   MFISYM +6
1310   REF  12 LAST 648    34,2237  01574 0                  MFI +12D
1311                       34,2240  74455 0          VAD     VSR1
1312   REF   9 LAST 648    34,2241  01616 1                  TMFI +12D
1313   REF   3 LAST 648    34,2242  01616 1          STORE   MFISYM +12D  MFISYM=(MFI+TMFI)/2  SCALED BY 4
R1314
R1315
R1316  CALCULATE COF
R1317
 1318                      34,2243  70545 1          DLOAD   SR1
 1319  REF   3 LAST 647    34,2244  01645 1                  CAM
 1320                      34,2245  45325 1          PDDL    DSU         PDO CAM                          $4
 1321  REF   4 LAST 646    34,2246  30414 0                  HALFA
 1322  REF   4 LAST 648    34,2247  01645 1                  CAM
 1323                      34,2250  65204 1          BOVB    PDDL        PD2 1 - CAM                      $2
 1324  REF   1             34,2251  73501 1                  SIGNMPAC
 1325  REF   4 LAST 648    34,2252  01622 0                  MFISYM +16D
 1326                      34,2253  56225 1          DSU     DDV
 1327                      34,2254  00001 0                  0
 1328                      34,2255  00003 1                  2
 1329                      34,2256  65366 1          SQRT    PDDL        COFZ = SQRT(MFISYM8-CAM)/1-CAM)
 1330  REF   5 LAST 648    34,2257  01612 0                  MFISYM +8D                       $ ROOT 2
 1331                      34,2260  56225 1          DSU     DDV
 1332                      34,2261  00001 0                  0
 1333                      34,2262  00003 1                  2
 1334                      34,2263  65366 1          SQRT    PDDL        COFY = SQRT(MFISYM4-CAM)/(1-CAM)  $ROOT2
```

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```
1335   REF   6 LAST 648   34,2264  01602 1                    MFISYM
1336                      34,2265  56225 1            DSU     DDV
1337                      34,2266  00001 0                    0
1338                      34,2267  00003 1                    2
1339                      34,2270  55566 1            SQRT    VDEF          COFX = SQRT(MFISYM-CAM)/(1-CAM)  $ROOT 2
1340                      34,2271  77656 1            UNIT
1341   REF   4 LAST 648   34,2272  01624 0            STORE   COF
R13412
R1342  DETERMINE  LARGEST COF AND ADJUST ACCORDINGLY
R13425
1343                      34,2273  45345 1  COFMAXGO  DLOAD   DSU
1344   REF   5 LAST 649   34,2274  01624 0                    COF
1345   REF   6 LAST 649   34,2275  01626 1                    COF +2
1346                      34,2276  71240 1            BMN     DLOAD         COFY G COFX
1347   REF   1            34,2277  70306 0                    COMP12
1348   REF   7 LAST 649   34,2300  01624 0                    COF
1349                      34,2301  50025 0            DSU     BMN
1350   REF   8 LAST 649   34,2302  01630 0                    COF +4
1351   REF   1            34,2303  70363 0                    METHOD3       COFZ G COFX OR COFY
1352                      34,2304  77650 1            GOTO
1353   REF   1            34,2305  70337 1                    METHOD1       COFX G COFY OR COFZ
1354                      34,2306  45345 1  COMP12    DLOAD   DSU
1355   REF   9 LAST 649   34,2307  01626 1                    COF +2
1356   REF  10 LAST 649   34,2310  01630 0                    COF +4
1357                      34,2311  77640 0            BMN
1358   REF   2 LAST 649   34,2312  70363 0                    METHOD3       COFZ G COFY OR COFX

1359                      34,2313  51145 0  METHOD2   DLOAD   BPL           COFY MAX
1360   REF   5 LAST 648   34,2314  01637 1                    COFSKEW +2    UY
1361   REF   1            34,2315  70321 0                    J2POS
1362                      34,2316  57575 1            VLOAD   VCOMP
1363   REF  11 LAST 649   34,2317  01624 0                    COF
1364   REF  12 LAST 649   34,2320  01624 0            STORE   COF
1365                      34,2321  51145 0  J2POS     DLOAD   BPL
1366   REF   7 LAST 649   34,2322  01604 1                    MFISYM +2     UX UY
1367   REF   1            34,2323  70327 0                    DKU21
1368                      34,2324  57545 1            DLOAD   DCOMP         SIGN OF UX OPPOSITE TO UY
1369   REF  13 LAST 649   34,2325  01624 0                    COF
1370   REF  14 LAST 649   34,2326  01624 0            STORE   COF
1371                      34,2327  51145 0  DKU21     DLOAD   BPL
1372   REF   8 LAST 649   34,2330  01614 0                    MFISYM +10D   UY UZ
1373   REF   2 LAST 648   34,2331  71006 1                    LOCSKIRT
1374                      34,2332  57545 1            DLOAD   DCOMP         SIGN OF UZ OPPOSITE TO UY
1375   REF  15 LAST 649   34,2333  01630 0                    COF +4
1376   REF  16 LAST 649   34,2334  01630 0            STORE   COF +4
1377                      34,2335  77650 1            GOTO
1378   REF   3 LAST 649   34,2336  71006 1                    LOCSKIRT
1379                      34,2337  51145 0  METHOD1   DLOAD   BPL           COFX MAX
1380   REF   6 LAST 649   34,2340  01635 0                    COFSKEW       UX
1381   REF   1            34,2341  70345 1                    J1POS
```

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```
1382                        34,2342  57575 1          VLOAD   VCOMP
1383  REF  17 LAST 649      34,2343  01624 0                  COF
1384  REF  18 LAST 650      34,2344  01624 0          STORE   COF
1385                        34,2345  51145 0  J1POS   DLOAD   BPL
1386  REF   9 LAST 649      34,2346  01604 1                  MFISVM +2          UX UY
1387  REF   1               34,2347  70353 0                  DKJ13
1388                        34,2350  57545 1          DLOAD   DCOMP
1389  REF  19 LAST 650      34,2351  01626 1                  COF +2
1390  REF  20 LAST 650      34,2352  01626 1          STORE   COF +2             SIGN OF UY OPPOSITE TO UX
1391                        34,2353  51145 0  DKU12   DLOAD   BPL
1392  REF  10 LAST 650      34,2354  01606 0                  MFISVM +4          UX UZ
1393  REF   4 LAST 649      34,2355  71006 1                  LOCSKIRT
1394                        34,2356  57545 1          DLOAD   DCOMP              SIGN OF UZ OPPOSITE TO UY
1395  REF  21 LAST 650      34,2357  01630 0                  COF +4
1396  REF  22 LAST 650      34,2360  01630 0          STORE   COF +4
1397                        34,2361  77650 1          GOTO
1398  REF   5 LAST 650      34,2362  71006 1                  LOCSKIRT
1399                        34,2363  51145 0  METHOD3 DLOAD   BPL                COFZ MAX
1400  REF   7 LAST 649      34,2364  01641 0                  COFSKEW +4         UZ
1401  REF   1               34,2365  70371 0                  J3POS
1402                        34,2366  57575 1          VLOAD   VCOMP
1403  REF  23 LAST 650      34,2367  01624 0                  COF
1404  REF  24 LAST 650      34,2370  01624 0          STORE   COF
1405                        34,2371  51145 0  J3POS   DLOAD   BPL
1406  REF  11 LAST 650      34,2372  01606 0                  MFISVM +4          UX UZ
1407  REF   1               34,2373  70377 0                  DKJ31
1408                        34,2374  57545 1          DLOAD   DCOMP
1409  REF  25 LAST 650      34,2375  01624 0                  COF                SIGN OF UX OPPOSITE TO UZ
1410  REF  26 LAST 650      34,2376  01624 0          STORE   COF
1412                        34,2377  51145 0  DKU31   DLOAD   BPL
1413  REF  12 LAST 650      34,2400  01614 0                  MFISVM +10D        UY UZ
1414  REF   6 LAST 650      34,2401  71006 1                  LOCSKIRT
1415                        34,2402  57545 1          DLOAD   DCOMP
1416  REF  27 LAST 650      34,2403  01626 1                  COF +2             SIGN OF UY OPPOSITE TO UZ
1417  REF  28 LAST 650      34,2404  01626 1          STORE   COF +2
1418                        34,2405  77650 1          GOTO
1419  REF   7 LAST 650      34,2406  71006 1                  LOCSKIRT
```

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R1470 MATRIX OPERATIONS

```
1471                          35,3417          BANK   35
1472  REF  8 LAST 646           E3              EBANK= M1S

1473                 35,3417  77601 0  MXM3    SETPD
1474                 35,3420  00001 0                 0
1487                 35,3421  64743 0          DLOAD* PDDL*
1488                 35,3422  77762 1                 120,2
1489                 35,3423  77770 1                 6,2
1490                 35,3424  55523 0          PDDL*  VDEF
1491                 35,3425  77776 1                 0,2
1492                 35,3426  64717 1          MXV*   PDDL*
1493                 35,3427  00001 0                 0,1
1494                 35,3430  77760 0                 140,2
1495                 35,3431  64723 0          PDDL*  PDDL*
1496                 35,3432  77766 0                 80,2
1497                 35,3433  77774 0                 2,2
1498                 35,3434  63666 1          VDEF   MXV*
1499                 35,3435  00001 0                 0,1
1500                 35,3436  64723 0          PDDL*  PDDL*
1501                 35,3437  77756 0                 160,2
1502                 35,3440  77764 1                 100,2
1503                 35,3441  55523 0          PDDL*  VDEF
1504                 35,3442  77772 0                 4,2
1505                 35,3443  41517 1          MXV*   PUSH
1506                 35,3444  00001 0                 0,1
1507                 35,3445  77650 1          GOTO
1508  REF  2 LAST 647 35,3446  73456 1                 TRNSPSPD
R1509                  RETURN WITH M1XM2 IN PD LIST
R1510
1511                 35,3447  76601 1  TRANSPOS SETPD  VLOAD*
1512                 35,3450  00001 0                 0
1518                 35,3451  00001 0                 0,1
1519                 35,3452  62713 0          PDVL*  PDVL*
1520                 35,3453  00007 0                 6,1
1521                 35,3454  00015 0                 120,1
1522                 35,3455  77606 1          PUSH
1528                 35,3456  65345 0  TRNSPSPD DLOAD  PDDL
1529                 35,3457  00003 1                 2
1530                 35,3460  00007 0                 6
1531                 35,3461  14003 1          STODL  2
1532                 35,3462  77626 0          STADR
1533                 35,3463  63770 1          STODL  6
1534                 35,3464  00005 1                 4
1535                 35,3465  77725 1          PDDL
1536                 35,3466  00015 0                 120
1537                 35,3467  14005 1          STODL  4
1538                 35,3470  77626 0          STADR
1539                 35,3471  63762 1          STODL  120
```

MXM3 MULTIPLIES 2 3X3 MATRICES
AND LEAVES RESULT IN PD LIST
ADDRESS OF 1ST MATRIX IN XR1
ADDRESS OF 2ND MATRIX IN XR2
DEFINE VECTOR M2(COL 1)
M1XM2(COL 1) IN PD
DEFINE VECTOR M2(COL 2)
M1XM2(COL 2) IN PD
DEFINE VECTOR M2(COL 3)
M1XM2(COL 3) IN PD
REVERSE ROWS AND COLS IN PD AND
TRANSPOS TRANSPOSES A 3X3 MATRIX
AND LEAVES RESULT IN PD LIST
MATRIX ADDRESS IN XR1
MATRIX IN PD
ENTER WITH MATRIX IN PD LIST

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```
1540                35,3472  00013 0              10D
1541                35,3473  77725 1      PDDL
1542                35,3474  00017 1              14D
1543                35,3475  14013 0      STODL   10D
1544                35,3476  77626 0      STADR
1545                35,3477  77760 0      STORE   14D
1546                35,3500  77616 0      RVQ                RETURN WITH TRANSPOSED MATRIX IN PD LIST
```

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```
 1547                                  34,2407          BANK   34
 1548   REF   9 LAST 651                  E3            EBANK= MIS

 1551                        34,2407   00013 0  MINANG   2DEC   0.005369375
C1551                        34,2410   13563 0
 1552                        34,2411   17070 0  MAXANG   2DEC   0.472222222
C1552                        34,2412   34343 1
 1553                        34,2413   20000 0  HALFA    2DEC   0.5
C1553                        34,2414   00000 1
 1554                        34,2415   00000 1  NIL      2DEC   0.0
C1554                        34,2416   00000 1
 1555                        34,2417   00000 1           2DEC   0.0
C1555                        34,2420   00000 1
 1556                        34,2421   00000 1           2DEC   0.0
C1556                        34,2422   00000 1
 15565                       34,2423   20000 0           2DEC   0.5
C15565                       34,2424   00000 1
 1557                        34,2425   10000 0  QUARTA   2DEC   .25
C1557                        34,2426   00000 1
R1569          GIMBAL LOCK CONSTANTS

R1570  D = MSA CORRESPONDING TO GIMBAL LOCK = 60 DEGREES
R1571          NGL = BUFFER ANGLE (TO AVOID DIVISIONS BY ZERO) = 2 DEGREES

 1572                        34,2427   15666 0  SD       2DEC   .433015        = SIN(D)                  $2
C1572                        34,2430   20443 0
 1573                        34,2431   33555 1  <3S1     2DEC   .86603         = SIN(D)                  $1
C1573                        34,2432   01106 1
 1574                        34,2433   67777 1  <4       2DEC   -.25           = -COS(D)                 $2
C1574                        34,2434   77777 0
 1575                        34,2435   04000 0  <4SQ     2DEC   .125           = COS(D)COS(D)            $2
C1575                        34,2436   00000 1
 1576                        34,2437   00216 1  SNGLCD   2DEC   .008725        = SIN(NGL)COS(D)          $2
C1576                        34,2440   36323 0
 1577                        34,2441   17773 1  CNGL     2DEC   .499695        COS(NGL)                  $2
C1577                        34,2442   00057 0
 1578                        34,2443   12525 0  LOCKANGL 2DEC   .3333333333  $60DEGG
C1578                        34,2444   12525 0
 1579                                  35,3501          BANK   35
 1580   REF  10 LAST 653                E3            EBANK= MIS
R1600   ROUTINE FOR LIMITING THE SIZE OF MPAC ON OVERFLOW TO DP POSMAX OR DP NEGMAX

 1602                        35,3501   0 0006 1 SIGNMPAC EXTEND
 1603   REF   2 LAST 226    35,3502   3 7743 0          DCA    DPPOSMAX
 1604   REF 271 LAST 615    35,3503   52 145 0          DXCH   MPAC
 1605   REF 282 LAST 632    35,3504   10 000 0          CCS    A
 1606   REF 213 LAST 635    35,3505   3 7767 0          CAF    ZERO
 1607   REF   4 LAST 361    35,3506   1 6544 0          TCF    SLOAD2 +2
 1608                        35,3507   1 3510 1          TCF    +1
 1609                        35,3510   0 0006 1          EXTEND
```

L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 19 S3 E3

```
1610  REF   3 LAST 653     35,3511  4 7743 1          DCS    DPDSMAX
1611  REF   5 LAST 653     35,3512  1 6542 0          TCF    SLOAD2


R1612  INTERPRETIVE SUBROUTINE TO READ THE CDU ANGLES

1613  REF  14 LAST 533     35,3513  3 0034 0  READCDUK CA     CDUZ          LOAD T(MPAC) WITH CDU ANGLES
1614  REF 272 LAST 653     35,3514  54 146 0          TS     MPAC +2
1615                       35,3515  0 0006 1          EXTEND
1616  REF  30 LAST 503     35,3516  3 0033 1          DCA    CDUX          AND CHANGE MODE TO TRIPLE PRECISION
1617  REF   1              35,3517  1 6554 1          TCF    TLOAD +6



16171                              34,2445           BANK   34
16172  REF  11 LAST 653                 E3           EBANK= MIS
1620                       34,2445  66370 0  CDUTODCM AXT,1  SSP
1621                       34,2446  00003 1          DCT    3
1622  REF  16 LAST 454     34,2447  00051 0                 S1
1623                       34,2450  00001 0          DCT    1             SET XR1, S1, AND PD FOR LOOP
1624                       34,2451  00010 0          STORE  7
1625                       34,2452  77601 0          SETPD
1626                       34,2453  00001 0                 0
1627                       34,2454  47133 0  LOOPSIN  SLOAD* RTB
1628                       34,2455  00013 0                 10D,1
1629  REF  14 LAST 392     34,2456  33457 1                 CDULOGIC
1630                       34,2457  00013 0          STORE  10D           LOAD PD WITH 0 SIN(PHI)
1631                       34,2460  65356 1          SIN    PDDL                  2 COS(PHI)
1632                       34,2461  00013 0                 10D                   4 SIN(THETA)
1633                       34,2462  41546 0          COS    PUSH                  6 COS(THETA)
1634                       34,2463  71300 1          TIX,1  DLOAD                 8 SIN(PSI)
1635  REF   1              34,2464  70454 0                 LOOPSIN              10 COS(PSI)
1636                       34,2465  00007 0                 6
1637                       34,2466  72405 0          DMP    SL1
1638                       34,2467  00013 0                 10D
1639                       34,2470  10001 1          STORE  0,2           C0=COS(THETA)COS(PSI)
1640                       34,2471  41345 0          DLOAD  DMP
1641                       34,2472  00005 1                 4
1642                       34,2473  00001 0                 0
1643                       34,2474  41325 0          PDDL   DMP           (PD6 SIN(THETA)SIN(PHI))
1644                       34,2475  00007 0                 6
1645                       34,2476  00011 1                 8D
1646                       34,2477  72405 0          DMP    SL1
1647                       34,2500  00003 1                 2
1649                       34,2501  72421 0          BDSU   SL1
1650                       34,2502  00015 0                 12D
1651                       34,2503  10003 0          STORE  2,2           C1=-COS(THETA)SIN(PSI)COS(PHI)
1652                       34,2504  41345 0          DLOAD  DMP
1653                       34,2505  00003 1                 2
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L ATTITJDE MANEUVER ROJTINE USER'S OWN PAGE NO. 20 S3 E3

```
1654                    34,2506  00005 1                4
1655                    34,2507  41325 0        PDDL    DMP     (PD7 COS(PHI)SIN(THETA)) SCALED 4
1656                    34,2510  00007 0                6
1657                    34,2511  00011 1                8D
1658                    34,2512  72405 0        DMP     SL1
1659                    34,2513  00001 0                0
1660                    34,2514  72415 1        DAD     SL1
1661                    34,2515  00017 1                14D
1664                    34,2516  10005 0        STORE   4,2      C2=COS(THETA)SIN(PSI)SIN(PHI)
16645                   34,2517  77745 1        DLOAD
1665                    34,2520  00011 1                8D
1666                    34,2521  10007 1        STORE   6,2      C3=SIN(PSI)
16665                   34,2522  77745 1        DLOAD
1667                    34,2523  00013 0                10D
1668                    34,2524  72405 0        DMP     SL1
1669                    34,2525  00003 1                2
1670                    34,2526  10011 0        STORE   8D,2     C4=COS(PSI)COS(PHI)
1671                    34,2527  41345 0        DLOAD   DMP
1672                    34,2530  00013 0                10D
1673                    34,2531  00001 0                0
1674                    34,2532  72476 1        DCOMP   SL1
1675                    34,2533  10013 1        STORE   10D,2    C5=-COS(PSI)SIN(PHI)
1676                    34,2534  41345 0        DLOAD   DMP
1677                    34,2535  00005 1                4
1678                    34,2536  00013 0                10D
1679                    34,2537  72476 1        DCOMP   SL1
1680                    34,2540  10015 1        STORE   12D,2    C6=-SIN(THETA)COS(PSI)
16805                   34,2541  77745 1        DLOAD
1681                    34,2542  72405 0        DMP     SL1      (PUSH UP 7)
1682                    34,2543  00011 1                8D
1683                    34,2544  41325 0        PDDL    DMP      (PD7 COS(PHI)SIN(THETA)SIN(PSI)) SCALE4
1684                    34,2545  00007 0                6
1685                    34,2546  00001 0                0
1686                    34,2547  72415 1        DAD     SL1      (PUSH UP 7)
1688                    34,2550  77626 0        STADR           C7=COS(PHI)SIN(THETA)SIN(PSI)
1689                    34,2551  67760 1        STORE   14D,2    +COS(THETA)SIN(PHI)
16895                   34,2552  77745 1        DLOAD
1690                    34,2553  72405 0        DMP     SL1      (PUSH UP 6)
1691                    34,2554  00011 1                8D
1692                    34,2555  41325 0        PDDL    DMP      (PD6 SIN(THETA)SIN(PHI)SIN(PSI)) SCALE4
1693                    34,2556  00007 0                6
1694                    34,2557  00003 1                2
1695                    34,2560  72425 1        DSJ     SL1      (PUSH UP 6)
1696                    34,2561  77626 0        STADR
1697                    34,2562  67756 1        STORE   16D,2    C8=-SIN(THETA)SIN(PHI)SIN(PSI)
1698                    34,2563  77616 0        RVQ              +COS(THETA)COS(PHI)

R1700  CALCJLATION OF THE MATRIX DEL.....

R1701          *      *              --T          *
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L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 21 S3 E3

```
R1702           DEL = (IDMATRIX)COS(A)+UU (1-COS(A))+JX SIN(A)          SCALED 1

R1703
R1704           WHERE U IS A UNIT VECTOR (DP SCALED 2) ALONG THE AXIS OF ROTATION.
R1706           A IS THE ANGLE OF ROTATION (DP SCALED 2)
R1707
R1708           UPON ENTRY THE STARTING ADDRESS OF U IS COF, AND A IS IN MPAC

 1709                          34,2564   41401 1  DELCOMP  SETPD   PUSH            MPAC CONTAINS THE ANGLE A
 1710                          34,2565   00001 0                   0
 1711                          34,2566   65356 1           SIN     PDDL            PD0 = SIN(A)
 1712                          34,2567   41546 0           COS     PUSH            PD2 = COS(A)
 17125                         34,2570   65302 0           SR2     PDDL            PD2 = COS(A)                          $8
 1713                          34,2571   41021 1           BDSU    BOVB
 1714   REF   5 LAST 648      34,2572   30414 0                   HALFA
 17141  REF   2 LAST 648      34,2573   73501 1                   SIGNMPAC
 17142                         34,2574   77725 1           PDDL            PD4 = 1-COS(A)

R1715   COMPUTE THE DIAGONAL COMPONENTS OF DEL

 1716   REF  29 LAST 650      34,2575   01624 0                   COF
 1717                          34,2576   41316 0           DSQ     DMP
 1718                          34,2577   00005 1                   4
 1719                          34,2600   52415 0           DAD     SL3             UXUX(1-COS(A))                        $8
 1720                          34,2601   00003 1                   2
 1721                          34,2602   77604 0           BOVB
 1722   REF   3 LAST 656      34,2603   73501 1                   SIGNMPAC
 1723   REF   2 LAST 645      34,2604   15560 0           STODL   DEL             UX UX(1-COS(A)) +COS(A)               $1
 1724   REF  30 LAST 656      34,2605   01626 1                   COF +2
 1725                          34,2606   41316 0           DSQ     DMP
 1726                          34,2607   00005 1                   4
 1727                          34,2610   52415 0           DAD     SL3             UYUY(1-COS(A))                        $8
 1728                          34,2611   00003 1                   2
 1729                          34,2612   77604 0           BOVB
 1730   REF   4 LAST 656      34,2613   73501 1                   SIGNMPAC
 1731   REF   3 LAST 656      34,2614   15570 1           STODL   DEL +8D         UY UY(1-COS(A)) +COS(A)               $1
 1732   REF  31 LAST 656      34,2615   01630 0                   COF +4
 1733                          34,2616   41316 0           DSQ     DMP
 17331                         34,2617   00005 1                   4
 17332                         34,2620   52415 0           DAD     SL3             UZUZ(1-COS(A))                        $8
 17333                         34,2621   00003 1                   2
 17334                         34,2622   77604 0           BOVB
 17335  REF   5 LAST 656      34,2623   73501 1                   SIGNMPAC
 17336  REF   4 LAST 656      34,2624   01600 0           STORE   DEL +16D        UZ UZ(1-COS(A)) +COS(A)               $1

R1734   COMPUTE THE OFF DIAGONAL TERMS OF DEL

 1735                          34,2625   41345 0           DLOAD   DMP
 1736   REF  32 LAST 656      34,2626   01624 0                   COF
 1737   REF  33 LAST 656      34,2627   01626 1                   COF +2
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L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 22 S3 E3

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1738                          34,2630  72405 0        DMP     SL1
1739                          34,2631  00005 1                4
1740                          34,2632  41325 0        PDDL    DMP             D6  UX UY (1-COS A)          $ 4
1741  REF  34 LAST 656        34,2633  01630 0                COF +4
1742                          34,2634  00001 0                0
1743                          34,2635  43206 1        PUSH    DAD             D8  UZ SIN A                 $ 4
1744                          34,2636  00007 0                6
1745                          34,2637  41112 0        SL2     BOVB
1746  REF   6 LAST 656        34,2640  73501 1                SIGNMPAC
1747  REF   5 LAST 656        34,2641  15566 0        STODL   XEL +6
1748                          34,2642  62421 1        BDSU    SL2
1749                          34,2643  77604 0        BOVB
1750  REF   7 LAST 657        34,2644  73501 1                SIGNMPAC
1751  REF   6 LAST 657        34,2645  15562 1        STODL   XEL +2
1752  REF  35 LAST 657        34,2646  01624 0                COF
1753                          34,2647  41205 0        DMP     DMP
1754  REF  36 LAST 657        34,2650  01630 0                COF +4
1755                          34,2651  00005 1                4
1756                          34,2652  65352 0        SL1     PDDL            D6  UX UZ (1-COS A )         $ 4
1757  REF  37 LAST 657        34,2653  01626 1                COF +2
1758                          34,2654  41405 0        DMP     PUSH            D8  UY SIN(A)
1759                          34,2655  00001 0                0
1760                          34,2656  62415 0        DAD     SL2
1761                          34,2657  00007 0                6
1762                          34,2660  77604 0        BOVB
1763  REF   8 LAST 657        34,2661  73501 1                SIGNMPAC
1764  REF   7 LAST 657        34,2662  15564 1        STODL   XEL +4          UX UZ (1-COS(A))+UY SIN(A)
1765                          34,2663  62421 1        BDSU    SL2
1766                          34,2664  77604 0        BOVB
1767  REF   9 LAST 657        34,2665  73501 1                SIGNMPAC
1768  REF   8 LAST 657        34,2666  15574 0        STODL   XEL +12D        UX UZ (1-COS(A))-UY SIN(A)
1769  REF  38 LAST 657        34,2667  01626 1                COF +2
1770                          34,2670  41205 0        DMP     DMP
1771  REF  39 LAST 657        34,2671  01630 0                COF +4
1772                          34,2672  00005 1                4
1773                          34,2673  65352 0        SL1     PDDL            D6  UY UZ (1-COS(A))         $ 4
1774  REF  40 LAST 657        34,2674  01624 0                COF
1775                          34,2675  41405 0        DMP     PUSH            D8  UX SIN(A)
1776                          34,2676  00001 0                0
1777                          34,2677  62415 0        DAD     SL2
1778                          34,2700  00007 0                6
1779                          34,2701  77604 0        BOVB
1780  REF  10 LAST 657        34,2702  73501 1                SIGNMPAC
1781  REF   9 LAST 657        34,2703  15576 1        STODL   XEL +14D        UY UZ(1-COS(A)) +UX SIN(A)
1782                          34,2704  62421 1        BDSU    SL2
1783                          34,2705  77604 0        BOVB
1784  REF  11 LAST 657        34,2706  73501 1                SIGNMPAC
1785  REF  10 LAST 657        34,2707  01572 0        STORE   XEL +10D        UY UZ (1-COS(A)) -UX SIN(A)
1786                          34,2710  77616 0        RVQ
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L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 23 S3 E3

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R1787   DIRECTION COSINE MATRIX TO CDU ANGLE ROUTINE
R1788   X1 CONTAINS THE COMPLEMENT OF THE STARTING ADDRESS FOR MATRIX (SCALED 2)
R1789   LEAVES CDU ANGLES SCALED 2PI IN V(MPAC)
R1790   COS(MGA) WILL BE LEFT IN S1 (SCALED 1)

R1791   THE DIRECTION COSINE MATRIX RELATING S/C AXES TO STABLE MEMBER AXES CAN BE WRITTEN AS***

R1793           C =COS(THETA)COS(PSI)
R1794            0
R1795           C =-COS(THETA)SIN(PSI)COS(PHI)+SIN(THETA)SIN(PHI)
R1796            1
R1797           C =COS(THETA)SIN(PSI)SIN(PHI) + SIN(THETA)COS(PHI)
R1798            2
R1799           C =SIN(PSI)
R1800            3
R1801           C =COS(PSI)COS(PHI)
R1802            4
R1803           C =-COS(PSI)SIN(PHI)
R1804            5
R1805           C =-SIN(THETA)COS(PSI)
R1806            6
R1807           C =SIN(THETA)SIN(PSI)COS(PHI)+COS(THETA)SIN(PHI)
R1808            7
R1809           C =-SIN(THETA)SIN(PSI)SIN(PHI)+COS(THETA)COS(PHI)
R1810            8

R1811           WHERE PHI = OGA
R1812                 THETA = IGA
R1813                 PSI = MGA

 1814                       34,2711   67543 1  DCMTOCDU DLOAD*  ARCSIN
 1815                       34,2712   00007 0                   6,1
 1816                       34,2713   71406 0           PUSH    COS             PD +0   PSI
 1817                       34,2714   41152 1           SL1     BOVB
 1818   REF  12 LAST 657    34,2715   73501 1                   SIGNMPAC
 1819   REF  17 LAST 654    34,2716   00051 0           STORE   S1
 1820                       34,2717   57543 1           DLOAD*  DCOMP
 1821                       34,2720   00015 0                   120,1
 1822                       34,2721   67471 1           DDV     ARCSIN
 1823   REF  18 LAST 658    34,2722   00051 0                   S1
 1824                       34,2723   51123 0           PDDL*   BPL             PD +2   THETA
 1825                       34,2724   00001 0                   0,1             MUST CHECK THE SIGN OF COS(THETA)
 1826   REF   1             34,2725   70737 0                   OKTHETA         TO DETERMINE THE PROPER QUADRANT
 1827                       34,2726   57545 1           DLOAD   DCOMP
 1828                       34,2727   43244 1           BPL     DAD
 1829   REF   1             34,2730   70734 0                   SJHALFA
 1830   REF   6 LAST 656    34,2731   30414 0                   HALFA
 1831                       34,2732   77650 1           GOTO
 1832   REF   1             34,2733   70736 1                   CALCPHI
 1833                       34,2734   77625 0  SJHALFA  DSJ
```

L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 24 S3 E3

```
1834  REF   7 LAST 658    34,2735  30414 0                    HALFA
1835                      34,2736  77606 1  CALCPHI   PUSH
1836                      34,2737  57543 1  DCTHETA   DLOAD*  DCOMP
1837                      34,2740  00013 0                    100.1
1838                      34,2741  67471 1           DDV      ARCSIN
1839  REF  19 LAST 658    34,2742  00051 0                    S1
1840                      34,2743  51123 0           PDDL*    BPL          PUSH DOWN PHI
1841                      34,2744  00011 1                    80.1
1842  REF   1             34,2745  70757 0                    DCPHI
1843                      34,2746  57545 1           DLOAD    DCOMP        PUSH UP PHI
1844                      34,2747  43244 1           BPL      DAD
1845  REF   1             34,2750  70754 0                    SJHALFAP
1846  REF   8 LAST 659    34,2751  30414 0                    HALFA
1847                      34,2752  77650 1           GOTO
1848  REF   1             34,2753  70760 1                    VECOFANG
1849                      34,2754  52025 1  SJHALFAP  DSJ      GOTO
1850  REF   9 LAST 659    34,2755  30414 0                    HALFA
1851  REF   2 LAST 659    34,2756  70760 1                    VECOFANG
1852                      34,2757  77745 1  DCPHI     DLOAD                PUSH UP PHI
1853                      34,2760  43466 1  VECOFANG  VDEF     RVQ
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L ATTITUDE MANEUVER ROUTINE USER'S OWN PAGE NO. 25 S3 E3

P1854 ROUTINES FOR TERMINATING THE AUTOMATIC MANEUVER AND RETURNING TO USER

```
 1855                          34,2761   77776 1  ENDMANU  EXIT
 1856  REF  34 LAST 635        34,2762   3 7762 0           CAF     TWO
 1857                          34,2763   0 0004 0           INHINT
 1858  REF  72 LAST 594        34,2764   0 5663 1           TC      WAITLIST        PREPARE FOR A GOOD (NORMAL) RETURN VIA
18581  REF  12 LAST 654                        E3           EBANK=  MIS
 1859                          34,2765   03710 1            2CADR   GOODMANU       GOODEND
C1859  REF   1                34,2766   70063 0
 1860                          34,2767   0 0003 1           RELINT
 1861  REF  60 LAST 620        34,2770   0 5567 0           TC      ENDOFJOB

 1862                          34,2771   77776 1  TOOBAD   EXIT                    INITIAL OR FINAL GIMBAL ANGLES IN
 1863  REF  85 LAST 660        34,2772   3 7762 0           CAF     TWO             GIMBAL LOCK
 1864                          34,2773   0 0004 0           INHINT
 1865  REF  73 LAST 660        34,2774   0 5663 1           TC      WAITLIST
18651  REF  13 LAST 660                        E3           EBANK=  MIS
 1866                          34,2775   03001 0            2CADR   NOGO            PREPARE FOR A BAD RETURN VIA BADEND
C1866  REF   1                34,2776   70063 0
 1867                          34,2777   0 0003 1           RELINT
 1868  REF  61 LAST 660        34,3000   0 5567 0           TC      ENDOFJOB

 1869  REF   2 LAST 100        34,3001   0 6076 0  NOGO     TC      FLAGDOWN        RESET BIT 11 OF FLAGWRD2 TO SIGNAL END
 1870                          34,3002   02000 0            OCT     2000            OF KALCMANU
 1871  REF  32 LAST 632        34,3003   3 6311 1           CAF     THREE
 1872  REF  36 LAST 589        34,3004   0 5225 1           TC      POSTJUMP        RETURN UNDER WAITLIST VIA BADEND
 1873  REF   3 LAST 197        34,3005   26715 0            CADR    BADEND          AND WAKE UP USER
```

L GIMBAL LOCK AVOIDANCE USER'S OWN PAGE NO. 1 S3

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R0730
R0731   DETECTING GIMBAL LOCK
 0732                        34,3006   51545 1  LOCSKIRT DLOAD   ABS
 0733   REF  41 LAST 657     34,3007   01624 0           COF
 0734                        34,3010   51025 1           DSJ     BPL       IF (ABS(COF )-CNGL) POS, GO TO NOGIMLOC
 0735   REF   1              34,3011   30442 0                   CNGL                0
 0736   REF   1              34,3012   71437 1                   NOGIMLOC
 0737                        34,3013   41345 0           DLOAD   DMP
 0738   REF  42 LAST 661     34,3014   01624 0                   COF
 0739   REF  43 LAST 661     34,3015   01630 0                   COF +4
 0740                        34,3016   65352 0           SL1     PDDL
 0741   REF  44 LAST 661     34,3017   01624 0                   COF
 0742                        34,3020   72405 0           DMP     SL1
 0743   REF  45 LAST 661     34,3021   01626 1                   COF +2
 0744                        34,3022   63525 0           PDDL    DSQ
 0745   REF  46 LAST 661     34,3023   01624 0                   COF
 07455                       34,3024   55552 0           SL1     VDEF                2
 0747   REF   4 LAST  32     34,3025   01602 1           STORE   K1        V1 = (COF   , COF COF , COF COF )        $2
 0748                        34,3026   53276 1           VCOMP   VAD                 0       0   1       0   2
 0749   REF  10 LAST 659     34,3027   30414 0                   HALFA     -
 0750   REF   4 LAST  32     34,3030   15610 1           STODL   K2        V2 = ((1-V1 ), -V1 , -V1 )               $2
 0751   REF  47 LAST 661     34,3031   01626 1                   COF +2              0       1       2
 0759                        34,3032   65276 1           DCOMP   PDDL
 0761   REF  48 LAST 661     34,3033   01630 0                   COF +4
 0762                        34,3034   55525 0           PDDL    VDEF      -
 0763   REF   2 LAST 648     34,3035   30416 1                   NIL       V3 = (0, COF , -COF )
 0764   REF   4 LAST  32     34,3036   25616 1           STOVL   K3                  2       1
 0765   REF  14 LAST 660     34,3037   01544 0                   MIS +6    -   -
 0766   REF   1              34,3040   01635 0           STORE   IG        IG = MIS                                 $2
 0767                        34,3041   76521 0           MXV     VSL1              3
 0769   REF   5 LAST 661     34,3042   01602 1                   K1                      -   -   -   -
 0770   REF   1              34,3043   15602 1           STODL   P21       (P21, D21, G21) = (V1, V2, V3) IG        $2
 0779   REF   1              34,3044   01606 0                   G21
 0780                        34,3045   65316 0           DSQ     PDDL
 0781   REF   1              34,3046   01604 1                   D21
 0782                        34,3047   43316 1           DSQ     DAD
 0783                        34,3050   77766 0           SQRT                        2       2
 0784   REF   1              34,3051   01647 0           STORE   RAD       RAD = SQRT(D21 D21 + G21 G21)
 0786                        34,3052   50025 0           DSJ     BMN
 0789   REF   1              34,3053   30440 1                   SNGLCD    IF (RAD-SNGLCD) NEG, GO TO NOGIMLOC
 0790   REF   2 LAST 661     34,3054   71437 1                   NOGIMLOC
 0791                        34,3055   51145 0           DLOAD   BPL
 0792   REF   2 LAST 661     34,3056   01606 0                   G21
 07925  REF   1              34,3057   71066 1                   DKG21
 0793                        34,3060   57575 1           VLOAD   VCOMP     IF G21 IS NEG ...
 07935  REF   2 LAST 661     34,3061   01635 0                   IG        -   -
 0794   REF   3 LAST 661     34,3062   15635 0           STODL   IG          IG =-IG, RAD =-RAD
 07942  REF   2 LAST 661     34,3063   01647 0                   RAD
 07944                       34,3064   77676 0           DCOMP
 07946  REF   3 LAST 661     34,3065   01647 0           STORE   RAD
```

L GIMBAL LOCK AVOIDANCE USER'S OWN PAGE NO. 2 S3

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07948                          34,3066  43345 1  DOG21    DLOAD   DAD      IF G21 IS POS....
0795   REF   2 LAST 661        34,3067  01602 1           P21
0796   REF   4 LAST 661        34,3070  01647 0           RAD              IF (ABS(P21+RAD)-SD) NEG, GO NOGIMLOC
0797                           34,3071  51400 1  BOV      ABS
0798   REF   1                 34,3072  71076 0           CBMCALC
0799                           34,3073  50025 0  DSU      BMN              CBM = D21/RAD                          $2
0800   REF   1                 34,3074  30430 0           SD
0801   REF   3 LAST 661        34,3075  71437 1           NOGIMLOC
0802                           34,3076  70545 1  CBMCALC  DLOAD   SR1
0803   REF   2 LAST 661        34,3077  01604 1           D21
0804                           34,3100  44271 0  DDV      BDSU
0805   REF   5 LAST 662        34,3101  01647 0           RAD
0806   REF   5 LAST 648        34,3102  01645 1           CAM
0807                           34,3103  71244 0  BPL      DLOAD
0808   REF   4 LAST 662        34,3104  71437 1           NOGIMLOC
0838   REF  13 LAST 648        34,3105  01574 0           MFI +12D
0839                           34,3106  65325 0  PDDL     PDDL
0840   REF  14 LAST 662        34,3107  01566 0           MFI +6
0841   REF  15 LAST 662        34,3110  01560 0           MFI              -
0842                           34,3111  76466 1  VDEF     VSL1             OGF = (MFI , MFI , MFI )               $2
0843   REF   1                 34,3112  15616 1  STODL    OGF                    0     3     6
0844   REF   2 LAST 662        34,3113  01616 1           OGF
0848                           34,3114  50015 0  DAD      BMN
0849   REF   2 LAST 661        34,3115  30442 0           CNGL             IF ((OGF ) + CNGL) NEG, GO TO ALTE
0850   REF   1                 34,3116  71134 1           ALTE                   0
0851                           34,3117  47375 0  VLOAD    VXV
0852   REF  11 LAST 661        34,3120  30414 0           HALFA
0853   REF   3 LAST 662        34,3121  01616 1           OGF
0854                           34,3122  77656 1  UNIT
0855   REF   1                 34,3123  25560 0  STOVL    E1               E1 = UNIT(OGI X OGF)
0856   REF   4 LAST 662        34,3124  01616 1           OGF
0857                           34,3125  53455 0  VAD      UNIT
0858   REF  12 LAST 662        34,3126  30414 0           HALFA
0859                           34,3127  77650 1  GOTO
0860   REF   1                 34,3130  71150 0           STORE2           E2 = UNIT(OGI X OGF)
0861                           34,3131  52175 0  SETE1    VLOAD   GOTO
0862   REF   3 LAST 661        34,3132  30420 1           NIL +2
0863   REF   1                 34,3133  71141 0           STORE1           E1 = (0,0,1)
0867                           34,3134  47375 0  ALTE     VLOAD   VXV
0868   REF  13 LAST 662        34,3135  30414 0           HALFA
0869   REF   5 LAST 662        34,3136  01616 1           OGF
0870                           34,3137  40056 0  UNIT     BOV
0871   REF   1                 34,3140  71131 1           SETE1
0872   REF   2 LAST 662        34,3141  01560 0  STOREE1  STORE   E1
0873                           34,3142  77635 1  VXV
0874   REF  14 LAST 662        34,3143  30414 0           HALFA
0875                           34,3144  47315 0  PDVL     VXV
0876   REF   6 LAST 662        34,3145  01616 1           OGF
0877   REF   3 LAST 662        34,3146  01560 0           E1
0878                           34,3147  53455 0  VAD      UNIT             E2 = UNIT(E1 X OGI + OGF X E1)
```

L GIMBAL LOCK AVOIDANCE USER'S OWN PAGE NO. 3 S3

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0879                        34,3150  77626 0  STORE2  STADR
0880   REF  1               34,3151  76211 1          STORE  E2          E2 = UNIT(OGI + OGF)                $2
08805                       34,3152  50201 1          SETPD  DOT
0881                        34,3153  00001 0                 0
0882   REF  4 LAST 661      34,3154  01635 0                 IG
0883                        34,3155  41552 0          SL1    PUSH        PD0 K2                              $2
0884                        34,3156  72516 0          DSQ    SL1
0885                        34,3157  50315 0          PDVL   DOT         PD2 (K2 K2)                         $2
0886   REF  4 LAST 662      34,3160  01560 0                 E1
0887   REF  5 LAST 663      34,3161  01635 0                 IG
0888                        34,3162  41552 0          SL1    PUSH        PD4 K1                              $2
0889                        34,3163  72516 0          DSQ    SL1
0890                        34,3164  45325 1          PDDL   DSJ         PD6 (K1 K1)                         $2
0891   REF  1               34,3165  30436 0                 K4SQ        = COS(D)COS(D)                      $2
0892                        34,3166  00007 0                 6
0893                        34,3167  63406 0          PUSH   DSQ         PD8 D1                              $2
0894                        34,3170  41325 0          PDDL   DMP         PD10 (D1 D1)                        $4
0895   REF  2 LAST 663      34,3171  01566 0                 E2          (K5)
0896   REF  1               34,3172  30432 1                 K3S1        SIN(D)                              $1
0897                        34,3173  62405 1          DMP    SL2
0898                        34,3174  00001 0                 0           K2
0899                        34,3175  63525 0          PDDL   DSQ         PD12 2 K2 K3 K5                     $2
0900   REF  3 LAST 663      34,3176  01566 0                 E2
0901                        34,3177  44352 0          SL1    BDSJ        K5K5 $2   PUSH UP 2 K2 K3 K5        $2
0902                        34,3200  43225 0          DSJ    DAD
0903                        34,3201  00003 1                 2
0904                        34,3202  00007 0                 6
0905                        34,3203  63406 0          PUSH   DSQ         PD12 D2                             $2
0906                        34,3204  41325 0          PDDL   DMP         PD14 (D2 D2)                        $4
0907   REF  4 LAST 663      34,3205  01566 0                 E2
0908   REF  2 LAST 663      34,3206  30432 1                 K3S1
0909                        34,3207  41421 0          BDSJ   PUSH
0910                        34,3210  00001 0                 0           PD16 B1                             $2
09105                       34,3211  77605 1          DMP
0911                        34,3212  00005 1                 4           B1 K1                               $4
0912                        34,3213  41552 0          SL1    PUSH        PD18 B1 K1                          $2
0913                        34,3214  65316 0          DSQ    PDDL        PD22 B1 B1 K1 K1                    $4
0914                        34,3215  00011 1                 8D
0915                        34,3216  41405 0          DMP    PUSH        PD22 D1 D2                          $4
0916                        34,3217  00015 0                 12D
0917                        34,3220  45221 1          BDSJ   DSJ
0918                        34,3221  00025 0                 20D
0919                        34,3222  00013 0                 10D         RSQ                                 $4
0920                        34,3223  41366 1          SQRT   DMP
0921                        34,3224  00023 0                 18D
0922                        34,3225  70525 1          PDDL   SR1         PD24 RADICAL                        $8
0923                        34,3226  00017 1                 14D
0924                        34,3227  72525 0          PDDL   SL1         PD26 (D2 D2)                        $8
0925                        34,3230  00025 0                 20D         4(B1 B1 K1 K1)                      $8
0926                        34,3231  77615 0          DAD                PUSH UP FOR (D2 D2)                 $8
```

L GIMBAL LOCK AVOIDANCE USER'S OWN PAGE NO. 4 S3

```
0927                        34,3232  70525 1          PDDL    SR1       PD26 DENOMR (D2 D2)
0928                        34,3233  00027 1                  22D
0929                        34,3234  41421 0          BDSU    PUSH      PD28 NUM
0930                        34,3235  00025 0                  20D
0931                        34,3236  56215 1          DAD     DDV       NUM
0932                        34,3237  00031 0                  24D       + RADICAL
0933                        34,3240  00033 1                  26D       DENOM
09335                       34,3241  60404 1          BOVB    SR2
09336  REF  13 LAST 658     34,3242  73501 1                  SIGNMPAC
0934   REF  1               34,3243  01610 1          STORE   C2SQP                                  $4
0935                        34,3244  77766 0          SQRT
0936   REF  1               34,3245  15614 0          STODL   C2PP                                   $2
0937                        34,3246  00031 0                  24D       NUM
0938                        34,3247  56221 0          BDSU    DDV       PUSH UP FOR NUM, DENOM
0939                        34,3250  60404 1          BOVB    SR2
09395  REF  14 LAST 664     34,3251  73501 1                  SIGNMPAC
0940   REF  1               34,3252  01612 0          STORE   C2SQM                                  $4
0941                        34,3253  77766 0          SQRT
0942   REF  1               34,3254  15616 1          STODL   C2MP                                   $2
0943   REF  2 LAST 647      34,3255  30426 1                  QUARTA    1                            $4
0944                        34,3256  75425 0          DSU     SQRT
0945   REF  2 LAST 664      34,3257  01610 1                  C2SQP
0946   REF  1               34,3260  15620 1          STODL   C1PP                                   $2
0947   REF  3 LAST 664      34,3261  30426 1                  QUARTA
0948                        34,3262  75425 0          DSU     SQRT
0949   REF  2 LAST 664      34,3263  01612 0                  C2SQM
0950   REF  1               34,3264  01622 0          STORE   C1MP                                   $2
0970                        34,3265  66370 0          AXT,1   SSP
0971                        34,3266  00004 0                  4
0972   REF  20 LAST 659     34,3267  00051 0                  S1
0973                        34,3270  00002 0                  2
0974                        34,3271  71201 1  NORM    SETPD   DLOAD
0975                        34,3272  00023 0                  18D
0976                        34,3273  00021 1                  16D       B1                           $2
0977                        34,3274  65203 0          DMP*    PDDL      PD18 = -Q                    $4
0978   REF  2 LAST 664      34,3275  01620 1                  C2PP +4,1
0979   REF  5 LAST 663      34,3276  01566 0                  E2
0980                        34,3277  40716 0          DSQ     DMP*
0981   REF  3 LAST 664      34,3300  01614 0                  C2SQP +4,1
0982                        34,3301  44312 1          SL2     BDSU
0983   REF  4 LAST 664      34,3302  30426 1                  QUARTA
0984                        34,3303  41366 1          SQRT    DMP
0985   REF  1               34,3304  30434 1                  K4        PD20 = -R                    $4
0986                        34,3305  40725 0          PDDL    DMP*
0987                        34,3306  00005 1                  4         K1                           $2
0988   REF  2 LAST 664      34,3307  01624 0                  C1PP +4,1
0989                        34,3310  65246 1          ABS     PDDL      PD22 AC1                     $4
0990                        34,3311  00023 0                  18D       -Q
0991                        34,3312  57415 0          DAD     DCOMP
0992                        34,3313  00025 0                  20D       -R
```

L GIMBAL LOCK AVOIDANCE USER'S OWN PAGE NO. 5 S3

```
0993                        34,3314  45325 1          PDDL    DSU         PD24 ANSW1 = Q + R                    $4
0994                        34,3315  00023 0                  18D         -Q
0995                        34,3316  00025 0                  20D         +R
0996                        34,3317  41476 1          DCOMP   PUSH        PD26 ANSW2 = Q - R                    $4
0997                        34,3320  45246 0          ABS     DSU
0998                        34,3321  00027 1                  22D         AC1
0999                        34,3322  65246 1          ABS     PDDL        PD28 ABS(ABS(ANSW2) -AC1)
1000                        34,3323  00031 0                  24D         ANSW1
1001                        34,3324  45246 0          ABS     DSU
1002                        34,3325  00027 1                  22D         AC1
1003                        34,3326  45246 0          ABS     DSU         ABS(ABS(ANSW1)-AC1)
1005                        34,3327  71244 0          BPL     DLOAD
1006  REF   I               34,3330  71353 1                  CKSGNAN2
1007                        34,3331  00031 0                  24D         ANSW1
1008                        34,3332  71244 0  SIGNANSW BPL     DLOAD
1009  REF   1               34,3333  71345 0                  SAMEASK1
1010                        34,3334  00005 1                  4           K1
1011                        34,3335  70640 1          BMN     DLOAD*
1012  REF   1               34,3336  71342 1                  DKC2
1013  REF   3 LAST 664      34,3337  01620 1                  C2PP +4,1
1014                        34,3340  77676 0  DPPSGNC2 DCOMP
1015  REF   4 LAST 665      34,3341  05620 0          STORE   C2PP +4,1
1016                        34,3342  52100 1  DKC2    TIX,1   GOTO
1017  REF   1               34,3343  71271 0                  NORM
1018  REF   I               34,3344  71356 1                  OUTCYCLE
1019                        34,3345  51145 0  SAMEASK1 DLOAD  BPL
1020                        34,3346  00005 1                  4           K1
1021  REF   2 LAST 665      34,3347  71342 1                  DKC2
1022                        34,3350  52143 0          DLOAD*  GOTO
1023  REF   5 LAST 665      34,3351  01620 1                  C2PP +4,1
1024  REF   1               34,3352  71340 0                  DPPSGNC2
1025                        34,3353  52145 0  CKSGNAN2 DLOAD  GOTO
1026                        34,3354  00033 1                  26D         ANSW2
1027  REF   1               34,3355  71332 0                  SIGNANSW
1077                        34,3356  77201 1  OUTCYCLE SETPD  VLOAD
1078                        34,3357  00001 0                  0
1079  REF   49 LAST 661     34,3360  01624 0                  COF                 -   -
1080                        34,3361  63241 0          DOT     PDVL        PD0 U1 = COF.E1
1081  REF   5 LAST 663      34,3362  01560 0                  E1
1082  REF   50 LAST 665     34,3363  01624 0                  COF                 -   -
1083                        34,3364  41441 0          DOT     PUSH        PD2 U2 = COF.E2
1084  REF   6 LAST 664      34,3365  01566 0                  E2
R1085 PICK THE NEW U WHICH IS CLOSEST TO THE OLD U
1086                        34,3366  41370 0          AXT,1   DMP
1087                        34,3367  00000 1                  0
1088  REF   6 LAST 665      34,3370  01614 0                  C2PP
1089                        34,3371  41325 0          PDDL    DMP         PD4 U2 C2(0)
1090  REF   3 LAST 664      34,3372  01620 1                  C1PP
1091                        34,3373  00001 0                  0           U1 C1(0)
1092                        34,3374  51415 0          DAD     ABS
```

L GIMBAL LOCK AVOIDANCE USER'S OWN PAGE NO. 6 S3

```
1093                          34,3375  41325 0          PDDL   DMP          PD4 ABS(U1 C1(0) + U2 C2(0))
1094                          34,3376  00003 1                 2
1095  REF  2 LAST 664         34,3377  01616 1                 C2MP
1096                          34,3400  41325 0          PDDL   DMP          PD6 U2 C2(1)
1097                          34,3401  00001 0                 0
1098  REF  2 LAST 664         34,3402  01622 0                 C1MP         PUSH UP U2 C2(1)
1099                          34,3403  51415 0          DAD    ABS          ABS(U1 C1(1) + U2 C2(1))
1100                          34,3404  77625 0          DSU                 PUSH UP 4
1101                          34,3405  74040 0          BMN    AXC,1
1102  REF  1                  34,3406  71410 1                 JZERO
1103                          34,3407  00002 0                 2
1104                          34,3410  74343 0  JZERO   DLOAD* VXSC
1105  REF  4 LAST 665         34,3411  01620 1                 C1PP,1
1106  REF  6 LAST 665         34,3412  01560 0                 E1
1107                          34,3413  74323 0          PDDL*  VXSC
1108  REF  7 LAST 665         34,3414  01614 0                 C2PP,1
1109  REF  7 LAST 665         34,3415  01566 0                 E2
1110                          34,3416  77655 1          VAD
1111                          34,3417  77656 1          UNIT                NEW COF = - -
1112  REF  51 LAST 665        34,3420  01624 0          STORE  COF          COF = C1 E1 + C2 E2
R1113 NEW MANEUVER ANGLE IS
1114                          34,3421  63545 0          DLOAD  DSQ
1115  REF  52 LAST 666        34,3422  01624 0                 COF
1116                          34,3423  44352 0          SL1    BDSU                 2
1117  REF  15 LAST 662        34,3424  30414 0                 HALFA       (1 - COF )                          $2
1118                          34,3425  63525 0          PDDL   DSQ                  0
1119  REF  11 LAST 666        34,3426  01566 0                 E2
1120                          34,3427  56221 0          BDSU   DDV                  2
1121  REF  5 LAST 664         34,3430  30426 1                 QUARTA      (1 - K5 )                           $4
1122                          34,3431  75542 0          SR1    SQRT
1123                          34,3432  72536 1          ARCSIN SL1
1124  REF  3 LAST 648         34,3433  01643 1          STORE  AM
1145                          34,3434  77614 1          CLRGO               STATE SWITCH NO. 31
1146                          34,3435  01221 1                 31D          0(OFF) = MANEUVER WENT THRU GIMBAL LOCK
1147  REF  1                  34,3436  71441 0                 NCALC        1(ON) = MANEUVER DID NOT GO THRU GIMLOCK
1148                          34,3437  77614 1  NOGIMLOC SET
1149                          34,3440  01061 1                 31D
1150                          34,3441  70740 0  NCALC   _XC,1  DLOAD*
1151  REF  2 LAST  67         34,3442  01652 1                 RATEINDX     CHOOSE THE DESIRED MANEUVER RATE
1152  REF  1                  34,3443  31465 1                 ARATE,1      FROM A LIST OF FOUR
1153                          34,3444  45002 1          SR4    CALL         COMPUTE THE INCREMENTAL ROTATION MATRIX
1154  REF  2 LAST 645         34,3445  70564 1                 DELCOMP      DEL CORRESPONDING TO A 1 SEC ROTATION
A1155                                                                      ABOUT COF
1156                          34,3446  74343 0          DLOAD* VXSC
1157  REF  2 LAST 666         34,3447  31465 1                 ARATE,1
1158  REF  53 LAST 666        34,3450  01624 0                 COF
1159  REF  1                  34,3451  15635 0          STODL  BRATE        COMPONENT MANEUVER RATES 45 DEG/SEC
1160  REF  4 LAST 666         34,3452  01643 1                 AM
1161                          34,3453  55605 1          DMP    DDV*
1162  REF  1                  34,3454  31475 0                 ANGLTIME
```

L GIMBAL LOCK AVOIDANCE USER'S OWN PAGE NO. 7 53

```
 1163   REF  3 LAST 666      34,3455  31465 1                ARATE,1
 1164                        34,3456  77661 0          SR
 1165                        34,3457  20606 0                   5
 1166   REF  1               34,3460  01645 1          STORE    TM          MANEUVER EXECUTION TIME SCALED AS T2
 1167                        34,3461  77614 1          SETGO                STATE SWITCH NO. 32
 1168                        34,3462  01022 0                   32D         0(OFF) = CONTINUE MANEUVER
 1169   REF  1               34,3463  71477 0                   NEWJELHI,1  1(ON) = START MANEUVER


R1170           THE FOUR SELECTABLE FREE FALL MANEUVER RATES SELECTED BY
R1171           LOADING RATEINDX WITH 0,2,4,6, RESPECTIVELY


 1172                        34,3464  00554 0  ARATE   2DEC  .0222222222  =.5 DEG/SEC      $ 22.5DEG/SEC
C1172                        34,3465  02660 0
 1173                        34,3466  02660 0          2DEC  .0888888888  = 2 DEG/SEC      $ 22.5DEG/SEC
C1173                        34,3467  13301 1
 1174                        34,3470  07070 1          2DEC  .2222222222  = 5 DEG/SEC      $ 22.5DEG/SEC
C1174                        34,3471  34344 0
 1175                        34,3472  16161 0          2DEC  .4444444444  =10 DEG/SEC     $ 22.5DEG/SEC
C1175                        34,3473  30707 1
 1177                        34,3474  00003 1  ANGLTIME 2DEC  .0001907349  = 100B-19     FUDGE FACTOR TO CONVERT
A1178                        34,3475  04000 0                            MANEUVER ANGLE TO MANEUVER TIME
```

L KALCMANU STEERING USER'S OWN PAGE NO. 1 S3

R0001 GENERATION OF STEERING COMMANDS FOR DIGITAL AUTOPILOT FREE FALL MANEUVERS

R0003 NEW COMMANDS WILL BE GENERATED EVERY ONE SECOND DURING THE MANEUVER

```
00035  REF   1                              E3          EBANK= TTEMP

0004   REF   55 LAST 646    34,3476  0 6112 0  NEWDELHI TC     INTPRET
0005                        34,3477    75160 1             AXC,1  AXC,2
0006   REF   15 LAST 661    34,3500    01535 0             MIS
0007   REF   11 LAST 657    34,3501    01557 1             CEL
0008                        34,3502    77624 1             CALL
0009   REF    3 LAST 647    34,3503    73417 1                    MXM3
0010                        34,3504    45575 1             VLOAD  STADR
0011   REF   16 LAST 668    34,3505    52225 0             STOVL  MIS +12D
0012                        34,3506    77626 0             STADR
0013   REF   17 LAST 668    34,3507    52233 1             STOVL  MIS +6D
0014                        34,3510    77626 0             STADR
0015   REF   18 LAST 668    34,3511    76241 1             STORE  MIS
0016                        34,3512    45160 1             AXC,1  CALL
0017   REF   19 LAST 668    34,3513    01535 0                    MIS
0018   REF    2 LAST 645    34,3514    70711 1                    DCMTOCDU
0019                        34,3515    77634 0             RTB
0020   REF    3 LAST 645    34,3516    33526 0                    V1STO2S
0021   REF    1            34,3517    01602 1             STORE  NCDU
0022                        34,3520    77414 0             BONCLR EXIT
0023                        34,3521    01202 0                    32D
0024   REF    1            34,3522    71602 0                    MANUSTAT
0025   REF   36 LAST 660    34,3523  3 7762 0             CAF    TWO
0026   REF    1            34,3524  55'653 1  INCRDCDU   TS     SPNDX
0027   REF    2 LAST 668    34,3525  51'653 0             INDEX  SPNDX
0028   REF    6 LAST 646    34,3526  3 1532 1             CA     BCDU
0029                        34,3527  0 0006 1             EXTEND
0030   REF    3 LAST 668    34,3530  5 1653 0             INDEX  SPNDX
0031   REF    2 LAST 668    34,3531  21'601 0             MSU    NCDU
0032                        34,3532  0 0006 1             EXTEND
0033   REF    1            34,3533  7 3601 1             MP     DT/TAU
0034   REF  283 LAST 653    34,3534  10 000 0             CCS    A
0035   REF  144 LAST 623    34,3535  6 7763 1             AD     ONE
0036                        34,3536  1 3540 1             TCF    +2
0037                        34,3537  4 0000 0             COM
0038   REF    4 LAST 668    34,3540  51'653 0             INDEX  SPNDX
0039   REF    2 LAST 648    34,3541  54 771 1             TS     DELDCDU
0040   REF    5 LAST 668    34,3542  51'653 0             INDEX  SPNDX
0041   REF    3 LAST 668    34,3543  3 1601 1             CA     NCDU
0042   REF    6 LAST 668    34,3544  51'653 0             INDEX  SPNDX
0043   REF    7 LAST 668    34,3545  57'532 1             XCH    BCDU
0044   REF    7 LAST 668    34,3546  51'653 0             INDEX  SPNDX
0045   REF   10 LAST 648    34,3547  54 766 1             TS     CDUXD
0046   REF    8 LAST 668    34,3550  11'653 1             CCS    SPNDX
0047   REF    1            34,3551  1 3524 0             TCF    INCRDCDU
```

BY LEM DAP

CDUXD, CDUYD, CDUZD EVERY TENTH SECOND

ANGLE INCREMENTS TO BE ADDED TO

OR PREVIOUS DESIRED CDU ANGLES

INITIAL CDU ANGLES

CONVERT TO 2S COMPLEMENT

+0 OTHERWISE

TO START MANEUVER

NEW CDU ANGLES

PICK UP THE NEW CDU ANGLES FROM MATRIX

CALCULATE NEW DESIRED CDU ANGLES

STABLE MEMBER AXES

COMPUTE THE NEW MATRIX FROM S/C TO

LOOP FOR THREE AXES

L KALCMANU STEERING USER'S OWN PAGE NO. 2 S3 E3

R0048 COMPARE PRESENT TIME WITH TIME TO TERMINATE MANEUVER

```
0049                        34,3552  0 0006 1  TMANUCHK EXTEND
0050   REF  21 LAST 586     34,3553  4 0025 1           DCS    TIME2
0051   REF   2 LAST 668     34,3554  53,606 1           DXCH   TTEMP
0052                        34,3555  0 0006 1           EXTEND
0053   REF   2 LAST 667     34,3556  3 1645 1           DCA    TM
0054   REF   3 LAST 669     34,3557  21,606 1           DAS    TTEMP          TM+TO-1-T
0055   REF   4 LAST 669     34,3560  11,605 1           CCS    TTEMP
0056   REF   1               34,3561  1 3642 0           TCF    CONTMANU       (TM+TO)-T G 164 SEC
0057                        34,3562  1 3564 1           TCF    +2
0058   REF   1               34,3563  1 3640 1           TCF    OVERMANU       (TM+TO)-T L -164 SEC
0059   REF   5 LAST 669     34,3564  11,606 1           CCS    TTEMP +1
0060   REF   2 LAST 669     34,3565  1 3642 0           TCF    CONTMANU       (TM+TO)-T G 1 SEC
0061   REF   1               34,3566  1 3570 1           TCF    MANUOFF        (TM+TO)-T E 1 SEC
0062                        34,3567  4 0000 0           COM                   (TM+TO)-T L 1 SEC
0063   REF   1               34,3570  6 3637 0  MANUOFF  AD     ONESFK +1      (TM+TO)-T E 1 SEC
0064                        34,3571  0 0006 1           EXTEND
0065   REF   2 LAST 669     34,3572  6 3640 0           BZMF   OVERMANU       THIS IS A SAFETY PLAY
0066                        34,3573  0 0004 0  MANUSTAL INHINT                PREPARE TO STOP THE MANEUVER
0067   REF  74 LAST 660     34,3574  0 5663 1           TC     WAITLIST
00675  REF   6 LAST 669                E3              EBANK= TTEMP
0068                        34,3575    03666 1          2CADR  MANJSTOP
C0068  REF   1               34,3576    70063 0
00682                       34,3577  0 0003 1           RELINT
00684  REF  52 LAST 660     34,3600  1 5567 1           TCF    ENDOFJOB

0069                        34,3601    03146 1  DT/TAU   DEC    .1

0070                        34,3602    77776 1  MANUSTAT EXIT                 INITIALIZATION ROUTINE
0071                        34,3603  0 0006 1           EXTEND                FOR AUTOMATIC MANEUVERS
0072   REF  22 LAST 669     34,3604  3 0025 0           DCA    TIME2
0073   REF   3 LAST 669     34,3605  21,645 0           DAS    TM             TM+TO   MANEUVER COMPLETION TIME
0074                        34,3606  0 0006 1           EXTEND
0075   REF   2 LAST 669     34,3607  4 3637 1           DCS    ONESFK
0076   REF   4 LAST 669     34,3610  21,645 0           DAS    TM             (TM+TO)-1
00761                       34,3611  0 0004 0           INHINT
0077   REF   2 LAST 666     34,3612  3 1634 1           CA     BRATE          X-AXIS MANEUVER RATE
0078   REF   8 LAST 648     34,3613  54 774 1           TS     OMEGAPD
0079   REF   3 LAST 669     34,3614  3 1636 0           CA     BRATE +2       Y-AXIS MANEUVER RATE
0080   REF   5 LAST 629     34,3615  54 775 0           TS     OMEGAQD
0081   REF   4 LAST 669     34,3616  3 1640 1           CA     BRATE +4       Z-AXIS MANEUVER RATE
0082   REF   7 LAST 630     34,3617  54 776 0           TS     OMEGARD

00821                       34,3620  0 0006 1           EXTEND
00822  REF  22 LAST 594     34,3621  3 0034 0           DCA    CDUY
00823  REF   7 LAST 591     34,3622  52 770 0           DXCH   CDUYD
00824  REF  31 LAST 654     34,3623  30 032 0           CAE    CDUX
00825  REF  11 LAST 668     34,3624  54 766 1           TS     CDUXD
00826  REF  23 LAST 611     34,3625  0 5270 1           TC     IBNKCALL
```

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```
 00827  REF   1                34,3626   40046 1            FCADR  SETMINDB
 00828                         34,3627   0 0003 1           RELINT
 0083   REF  12 LAST 464       34,3630   3 0025 0           CA     TIME1
 0084   REF   3 LAST 669       34,3631   6 3637 0           AD     ONESEK +1
 0085   REF   1                34,3632   57'604 1           XCH    NEXTIME
 00852  REF   1                34,3633   0 6060 1           TC     FLAGSUP          SET BIT 11 OF FLAGWRD2
 00854                         34,3634    02000 0           OCT    2000             TO SIGNAL KALCMANU IN PROCESS
 0086   REF   2 LAST 668       34,3635   1 3523 1           TCF    INCRNCDU -1

 0087                          34,3636    00000 1 ONESEK     DEC    0
 0088                          34,3637    00144 0            DEC    100

 0089   REF 145 LAST 668       34,3640   3 7763 1 OVERMANU  CAF    ONE              SAFETY PLAY
 0090   REF   1                34,3641   1 3573 1           TCF    MANUCTAL

 0091   REF  13 LAST 670       34,3642   4 0025 1 CONTMANU  CS     TIME1            RESET FOR NEXT DCDU UPDATE
 0092   REF   2 LAST 670       34,3643   6 1604 1           AD     NEXTIME
 0093   REF 284 LAST 668       34,3644   10 000 0           CCS    A
 0094   REF 146 LAST 670       34,3645   6 7763 1           AD     ONE
 0095   REF   1                34,3646   1 3651 1           TCF    MANUCALL
 0096   REF  15 LAST 635       34,3647   6 7745 0           AD     NEGMAX
 0097                          34,3650   4 0000 0           COM
 0098                          34,3651   0 0004 0 MANUCALL  INHINT                   CALL FOR NEXT UPDATE VIA WAITLIST
 0099   REF  75 LAST 669       34,3652   0 5663 1           TC     WAITLIST
 00991  REF   7 LAST 669                      E3            EBANK= TTEMP
 00992                         34,3653    03661 0           2CADR  JPDTCALL
C00992  REF   1                34,3654    70063 0
 00993                         34,3655   0 0003 1           RELINT
 0100   REF   4 LAST 670       34,3656   3 3637 0           CAF    ONESEK +1         INCREMENT TIME FOR NEXT UPDATE
 0101   REF   3 LAST 670       34,3657   27'604 0           ADS    NEXTIME
 0102   REF  63 LAST 669       34,3660   1 5567 1           TCF    ENDOFJOB



 0103   REF   3 LAST 490       34,3661   3 5655 1 JPDTCALL  CAF    PRIO34           SATELLITE PROGRAM TO CALL FOR JODATE
 0104   REF  12 LAST 453       34,3662   0 5516 0           TC     FINDVAC          OF STEERING COMMANDS
 01045  REF   8 LAST 670                      E3            EBANK= TTEMP
 0105                          34,3663    03476 1           2CADR  NEWDELHI
C0105   REF   2 LAST 667       34,3664    70063 0
 0106   REF  60 LAST 635       34,3665   0 5727 0           TC     TASKOVER
```

L KALCMANU STEERING USER'S OWN PAGE NO. 4 S3 E3

P0107 ROUTINE FOR TERMINATING AUTOMATIC MANEUVERS

```
0108   REF 214 LAST 653    34,3666   3 7767 0  MANUSTOP  CAF    ZERO       ZERO MANEUVER RATES
0109   REF   1             34,3667  54 773 0             TS     DELOCDU2
0110   REF   8 LAST 669    34,3670  54 776 0             TS     OMEGARD
0111   REF   1             34,3671  54 772 1             TS     DELOCDU1
0112   REF   6 LAST 669    34,3672  54 775 0             TS     OMEGAOD
0113   REF   2 LAST 646    34,3673   3 1633 0            CA     CPSI       SET DESIRED GIMBAL ANGLES TO
0114   REF   4 LAST 591    34,3674  54 770 0             TS     CDUZD      DESIRED FINAL GIMBAL ANGLES
0115   REF   1             34,3675   3 1632 1            CA     CTHETA
0116   REF   8 LAST 669    34,3676  54 767 0             TS     CDUYD
0117   REF  35 LAST 570    34,3677   3 0076 0            CA     STATE +2   CHECK TO SEE IF A FINAL YAW NECESSARY
0118   REF  43 LAST 625    34,3700   7 7746 1            MASK   BIT14
0119                       34,3701   0 0006 1            EXTEND
0120   REF   1             34,3702   1 3714 1            BZF    KALCROLL
0121   REF   5 LAST 647    34,3703   3 1631 1  ENDROLL   CA     CPHI       NO FINAL YAW
0122   REF  12 LAST 669    34,3704  54 766 1             TS     CDUXD
0123   REF 215 LAST 671    34,3705   3 7767 0            CAF    ZERO
0124   REF   9 LAST 669    34,3706  54 774 1             TS     OMEGAPD    I.E. MANEUVER DID NOT GO THRU
0125   REF   3 LAST 668    34,3707  54 771 1             TS     DELOCDU    GIMBAL LOCK ORIGINALLY
01251  REF   3 LAST 660    34,3710   0 6076 0  GOODMANU  TC     FLAG2DWN   RESET BIT 11 OF FLAGWRD2 TO SIGNAL END
01252                       34,3711   02000 0            OCT    2000       OF KALCMANU
01254  REF  37 LAST 660    34,3712   0 5225 1            TC     POSTJUMP   RETURN UNDER WAITLIST VIA GOODEND
0126   REF   1             34,3713   73520 1            CADR   CHKAKS

012605                                35,3520            BANK   35
012606 REF   9 LAST 670                 E3               EBANK= TTEMP
01261  REF  87 LAST 668    35,3520   3 7762 0  CHKAKS    CAF    TWO
012615 REF   9 LAST 668    35,3521  55 653 1   AKLOOP    TS     SPNDX      CHECK THE MAGNITUDE OF THE ATTITUDE
01262  REF 285 LAST 670    35,3522  50 000 1             INDEX  A          ERROR ON COMPLETION OF A KALCMANU
012625 REF  13 LAST 671    35,3523   3 0766 0            CA     CDUXD      SUPERVISED MANEUVER
01263                      35,3524   0 0006 1            EXTEND
012635 REF  10 LAST 671    35,3525   5 1653 0            INDEX  SPNDX      I.E.  CDUD - CDU
012636 REF  32 LAST 669    35,3526   20 032 1            MSU    CDUX
012637 REF 286 LAST 671    35,3527   10 000 0            CCS    A          IF THE MAGNITUDE OF THE ERROR EXCEEDS
01264  REF   1             35,3530   6 3545 0            AD     =-5DEG     5 DEGREES ON ANY AXIS DISPLAY AN ALARM
012645 REF   1             35,3531   1 3533 0            TCF    CHECKASG   INDICATING THAT SPACECRAFT MAY NOT HAVE
01265  REF   2 LAST 671    35,3532   6 3545 0            AD     =-5DEG     ACHIEVED THE DESIRED ATTITUDE.
012655                     35,3533   0 0006 1  CHECKASG  EXTEND
01266  REF   1             35,3534   6 3540 0            BZMF   AKOK
012665 REF  37 LAST 464    35,3535   0 4755 1            TC     ALARM
01267                      35,3536   01412 1             OCT    01412
012675 REF   1             35,3537   1 3542 0            TCF    ENDKMANU

01268  REF  11 LAST 671    35,3540   11 653 1  AKOK      CCS    SPNDX
012685 REF   1             35,3541   1 3521 0            TCF    AKLOOP

01269  REF  33 LAST 660    35,3542   3 6311 1  ENDKMANU  CAF    THREE      TERMINATE KALCMANU VIA GOODEND
012692 REF  38 LAST 671    35,3543   0 5225 1            TC     POSTJUMP
012694 REF   5 LAST 197    35,3544   26720 0             CADR   GOODEND
```

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012696                          35,3545   77070 0  =-5DEG    DEC     -455          =-5 DEGREES SCALED 180 DEG


012698                                    34,3714            BANK    34
012699 REF  10 LAST 671                      E3              EBANK=  TTEMP
0127   REF  36 LAST 671         34,3714   3 0076 0  KALCROLL CA      STATE +2      STATE SWITCH NO. 33
0128   REF  26 LAST 607         34,3715   7 7750 0           MASK    BIT12         0(OFF) = PERFORM A FINAL YAW
0129                            34,3716   0 0006 1           EXTEND                      IF NECESSARY
0130   REF   1                  34,3717   1 3721 1           BZF     DOROLL        1(ON) = IGNORE ANY FINAL YAW
0131   REF   1                  34,3720   1 3705 1           TCF     ENDROLL +2
0132   REF   6 LAST 671         34,3721   3 1631 1  DOROLL   CA      CPHI
0133                            34,3722   0 0006 1           EXTEND                PERFORM A FINAL ROLL TO
0134   REF  14 LAST 671         34,3723   20 766 1           MSU     CDUXD         COMPLETE AUTOMATIC MANEUVER
0135                            34,3724   0 0006 1           EXTEND
0136   REF   1                  34,3725   6 3735 0           BZMF    FROLLNEG
0137   REF 137 LAST 635         34,3726   54 001 1  FROLLPOS TS      L
0138   REF   1                  34,3727   3 3754 1           CA      ROLLRATE
0139   REF  10 LAST 671         34,3730   54 774 1           TS      OMEGAPD
0140   REF   1                  34,3731   4 3755 1           CS      DELFROLL
0141   REF 147 LAST 670         34,3732   6 7763 1           AD      ONE
0142   REF   4 LAST 671         34,3733   54 771 1           TS      DELCDU
0143   REF   1                  34,3734   1 3743 0           TCF     ROLLSTAL
0144                            34,3735   4 0000 0  FROLLNEG COM
0145   REF 138 LAST 672         34,3736   54 001 1           TS      L
0146   REF   2 LAST 672         34,3737   4 3754 0           CS      ROLLRATE
0147   REF  11 LAST 672         34,3740   54 774 1           TS      OMEGAPD
0148   REF   2 LAST 672         34,3741   3 3755 0           CA      DELFROLL
0149   REF   5 LAST 672         34,3742   54 771 1           TS      DELCDU
0150   REF 139 LAST 672         34,3743   3 0001 0  ROLLSTAL CA      L             ABS(CPHI-CDUXD)
0151                            34,3744   0 0006 1           EXTEND
0152   REF   1                  34,3745   7 3756 1           MP      INVRATE
0153                            34,3746   0 0006 1           EXTEND
0154   REF   2 LAST 672         34,3747   6 3703 0           BZMF    ENDROLL
0155   REF  76 LAST 670         34,3750   0 5663 1           TC      WAITLIST
01555  REF  11 LAST 672                        E3              EBANK=  TTEMP
0156                            34,3751    03703 0           2CADR   ENDROLL
C0156  REF   3 LAST 672         34,3752   70063 0
0157   REF  51 LAST 670         34,3753   0 5727 0           TC      TASKOVER


0158                            34,3754    01320 1  ROLLRATE DEC     720           = 1.98 DEGREES/SEC
0159                            34,3755    00022 1  DELFROLL DEC     18            MUST BE A WHOLE NUMBER
0160                            34,3756    21616 0  INVRATE  DEC     .555555
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L MISSION PHASE 2 GUIDANCE REFERENCE RELEASE + BOOST MONITOR USER'S OWN PAGE NO. 1 S3

R0001 PROGRAM NAME - MISSION PHASE 2 GUIDANCE REFERENCE RELEASE + BOOST MONITOR.

R0003 MODIFICATION NUMBER - 1 DATE - NOVEMBER 22, 1966 MODIFICATION BY - COVELLI

R0005 FUNCTIONAL DESCRIPTION -

R0006 THE FUNCTION OF MISSION PHASE 2 IS TO CONTROL THE SEQUENCE OF EVENTS IN THE 206 FLIGHT FROM GUIDANCE
R0008 REFERENCE RELEASE THROUGH LIFTOFF TO THE SIVB BOOSTER SHUTDOWN.

R0009 AT GUIDANCE REFERENCE RELEASE, THE GRR FLAG IS SET, PREREAD IS CALLED TO BEGIN COMPUTATION OF POSITION AND
R0011 VELOCITY, AND CALLS ARE MADE FOR DFI T/M CALIBRATION AND LIFTOFF

R0012 WHEN PRELAUNCH DETECTS THAT THE GRR FLAG IS SET, IT TERMINATES GYROCOMPASSING AND CALLS MP2JOB. MP2JOB
R0014 DISPLAYS 7 IN THE MAJOR MODE AND GOES TO MATRXJOB TO COMPUTE REFSMMAT.

R0015 AT LIFTOFF, THE LGC CLOCK IS ZEROED, CALLS ARE MADE FOR THE COLD FIRE PURGE AND POST LET JETTISON PROGRAMS.
R0017 THE MAJOR MODE IS CHANGED TO 11.

R0018 AT POST LET JETTISON, THE DV MONITOR IS ENABLED TO DETECT BOOSTER SHUTDOWN, THE ABORT COMMAND MONITOR AND THE
R0020 TUMBLE MONITOR ARE ENABLED, AND THE MAJOR MODE IS CHANGED TO 12.

R0021 THE VARIOUS LMP COMMANDS REQUIRED FOR MP2 ARE SCHEDULED BY WAITLIST CALLS.

R0023 AT DETECTION OF SIVB SHUTDOWN, AN EXECUTIVE CALL IS MADE TO MISSION PHASE 6.

R0025 CALLING SEQUENCE :

R0026 MISSION PHASE 2 IS BEGUN UPON RECEIPT OF THE GUIDANCE REFERENCE RELEASE SIGNAL (VERB 65 ENTER) VIA UPLINK.

R0028 SUBROUTINES CALLED :

R0029	PREREAD	1LMP
R0030	TUMTASK	2LMP
R0031	NEWMODEX	PHASCHNG
R0032	FINDVAC	NEWPHASE
R0033	NOVAC	DFITMCAL
R0034	SPVAC	IBNKCALL
R0035	WAITLIST	
R0036	LONGCALL	

R0037 NORMAL EXIT MODES :

L MISSION PHASE 2 GUIDANCE REFERENCE RELEASE + BOOST MONITOR USER'S OWN PAGE NO. 2 S3

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R0038     EXIT TO MISSION PHASE 6 AT S1VB SHUTDOWN.


R0039   ABORT EXIT MODES :

R0040       TO MISSION PHASE 3 IF SUBORBITAL ABORT COMMAND RECEIVED VIA UPLINK.
R0041       TO MISSION PHASE 4 IF CONTINGENCY ORBIT INSERTION COMMAND RECEIVED VIA UPLINK.
R0043       TO CHARALRM IF EITHER OF THE ABOVE ABORT COMMANDS RECEIVED WHILE ABORT COMMAND MONITOR NOT ENABLED.


R0045   OUTPUT :

R0046             TGRR          TIME OF GUIDANCE REFERENCE RELEASE
R0047             TPRELTER      TIME OF GYROCOMPASSING TERMINATION
R0048             TLIFTOFF      TIME OF LIFTOFF AND LGC CLOCK ZEROING
R0049             GRR FLAG      BIT2 FLAGWRD1 SET TO INDICATE GRR SIGNAL RECEIVED
R0050             SERVICER IS GOING AT END OF MISSION PHASE 2
R0051             MAJOR MODE DISPLAYS


R0052   ERASABLE INITIALIZATION :

R0053             DT-LIFT       DELTA TIME FROM GRR TO LIFTOFF, SINGLE PRECISION SCALED AT 2(+14) CS.
R0055             DT-LETJT      DELTA TIME FROM LIFTOFF TO POST LET JETTISON, DOUBLE PRECISION SCALED AT 2(+28) CS.
R0057             RAVEGON       POSITION AT GRR IN SM COORDINATES, VECTOR SCALED AT 2(+24) M.
R0059             VAVEGON       VELOCITY AT GRR IN SM COORDINATES, VECTOR SCALED AT 2(+7) M/CS.

R0061   ********  ALL OF THE ERASABLE INITIALIZATION MUST BE DONE DURING THE PRE-LAUNCH ERASABLE LOAD  ****************


R0063   DEBRIS :

R0064      CENTRALS AND EXECUTIVE WORK AREA.


0065                                    27,2000          BANK    27
0066   REF    8 LAST 389                   E3           EBANK=  TGRR


0067   REF    4 LAST 347    27,2000  0 6051 0  GRRPLACE  TC      FLAGUP
0068                        27,2001   00002 0            DCT     2
0069   REF   54 LAST 670    27,2002  0 5567 0            TC      ENDOFJOB
0070   REF    3 LAST 311    27,2003  3 5641 1  MP2TASK   CA      PRIO15
0071   REF   13 LAST 670    27,2004  0 5516 0            TC      FINDVAC
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L MISSION PHASE 2 GUIDANCE REFERENCE RELEASE + BOOST MONITOR USER'S OWN PAGE NO. 3 S3 E3

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0072   REF   9 LAST 674                    E3          EBANK= TGRR
0073                          27,2005   02056 0        2CADR  MP2JOB
C0073  REF   2 LAST  67       27,2006   56063 1
0074   REF   4 LAST 472       27,2007   3 1742 1       CA     DT-LIFT
0075   REF  77 LAST 672       27,2010   0 5663 1       TC     WAITLIST        SET UP CALL TO LIFTOFF PROGRAM
0076   REF  10 LAST 675                    E3          EBANK= TGRR
0077                          27,2011   02223 0        2CADR  LIFTOFF
C0077  REF   2 LAST  64       27,2012   56063 1
0078   REF   1                27,2013   0 4141 1       TC     2PHSCHNG
0079                          27,2014   00375 0        OCT    00375           5.37 SPOT FOR MP2TASK.
0080                          27,2015   00273 1        OCT    00273           3.27 SPOT TO FINISH PRELAUNCH.

0081   REF   2 LAST 675       27,2016   0 4141 1       TC     2PHSCHNG
0082                          27,2017   40132 0        OCT    40132           2.13 SPOT FOR LIFTOFF.
0083                          27,2020   00074 1        OCT    00074           4.7 SPOT FOR MP2JOB.

0084   REF  28 LAST 615       27,2021   3 7762 0       CAF    BIT2
0085   REF   2 LAST 452       27,2022   0 4105 1       TC     SETRSTRT        SET RESTART FLAG

0086   REF   1                27,2023   3 5652 0 SETPIPDT CAF    PRIO31          TWO SECONDS SCALED AT (CS) X 2(+8)
0087   REF   3 LAST 471       27,2024   54 765 1       TS     1/PIPADT

0088   REF   1                27,2025   3 2342 0       CA     AVEGADRS
0089   REF   8 LAST 628       27,2026   55'310 0       TS     DVSELECT

0090                          27,2027   0 0006 1       EXTEND
0091   REF   1                27,2030   3 2443 0       DCA    SVEXADRS
0092   REF   5 LAST 101       27,2031   53'073 0       DXCH   AVGEXIT

0093                          27,2032   0 0006 1       EXTEND
0094   REF   2 LAST 675       27,2033   3 2443 0       DCA    SVEXADRS
0095   REF   4 LAST 523       27,2034   53'075 0       DXCH   DVMNEXIT

0096   REF   5 LAST 614       27,2035   3 5661 0       CA     EBANK5
0097   REF  41 LAST 614       27,2036   54 003 0       TS     EBANK
0098   REF   1                27,2037   3 7751 0       CA     EBANK4
0099   REF 210 LAST 627       27,2040   54 002 1       TS     Q
0100   REF   3 LAST 390                    E5          EBANK= TEMPTIME
0101                          27,2041   0 0006 1       EXTEND                  GET TEMPTIME
0102   REF   4 LAST 675       27,2042   3 1562 1       DCA    TEMPTIME
0103   REF   1                27,2043   53'344 1       DXCH   TPREITER
0104                          27,2044   0 0006 1       EXTEND
0105   REF   2 LAST 675       27,2045   3 1344 0       DCA    TPREITER
0106                          27,2046   0 0006 1       EXTEND
0107   REF  42 LAST 675       27,2047   22 003 1       DXCH   EBANK
0108   REF   1                             E4          EBANK= TAVEGON
0109   REF   2 LAST 675       27,2050   53'511 1       DXCH   TAVEGON          STORE IN TAVEGON

0110   REF  11 LAST 675                    E3          EBANK= TGRR
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0111                        27,2051  0 0006 1          EXTEND
0112  REF   1              27,2052  3 2055 0          DCA     BBB3RBBB
0113                        27,2053  52 006 0          DTCB
0114  REF   8 LAST 480                 E5             EBANK=  DVCNTR
0115                        27,2054    02011 0  B3BBBB3B ZCADR  BIBIBIAS
C0115 REF   1              27,2055    60065 1

0116  REF  56 LAST 668     27,2056  0 6112 0  MP2J08   TC      INTPRET
0117                        27,2057    71331 0          SSP     DLOAD
0118  REF   5 LAST 496     27,2060    00765 0                  PHASENUM
0119                        27,2061    00002 0                  2
0120  REF   3 LAST 675     27,2062    01344 0                  TPREITER
0121  REF  12 LAST 675     27,2063    01737 0          STORE   TGRR
0122  REF   6 LAST 481     27,2064    01312 0          STORE   TEVENT          FOR DOWNLINK.
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L MISSION PHASE 2 GUIDANCE REFERENCE RELEASE + BOOST MONITOR USER'S OWN PAGE NO. 5 S3 E3

P0123 PROGRAM DESCRIPTION- MATRXJOB DATE: 18 JAN 1967
R0125 MOD NO: 2 LOG SECTION- MP 2 GRR + BOOST MONITOR
R0127 MOD BY: MILLER, LICKLY, KERNAN ASSEMBLY: SUNBURST REVISION 79

R0129 FUNCTIONAL DESCRIPTION

R0130 THIS PROGRAM CONSTRUCTS THE MATRIX WHICH RELATES THE STABLE MEMBER INERTIAL FRAME TO THE REFERENCE
R0132 FRAME (Z NORTH, X ALONG THE VERNAL EQUINOX.)

R0133 TWO INTERMEDIATE COORDINATE SYSTEMS ARE USED: A LOCAL, EARTH FIXED, VERTICAL, SOUTH, EAST SYSTEM AND AN
R0135 EARTH REFERENCE X, Y, Z SYSTEM. IN THIS LATTER SYSTEM, THE Z AXIS IS THE EARTH'S ROTATION AXIS, THE X AXIS IS
R0137 NORMAL TO Z IN THE PLANE OF Z AND THE LOCAL VERTICAL, POSITIVE IN THE DIRECTION OF V. Y IS Z CROSS X.

R0139 THE FIRST COMPUTATION IS OF AZGR, THE ANGLE BETWEEN THE REFERENCE INERTIAL AND EARTH REFERENCE X-Z
R0141 PLANES (THE Z AXES ARE COINCIDENT). AZGR IS COMPUTED BY CONVERTING THE TIME FROM THE BEGINNING OF THE EPHEMERIS
R0143 YEAR TO RELEASE (TEPHEM + TPRELTER) TO REVOLUTIONS (DAYS). THE WHOLE REVS ARE DISCARDED AND THE INITIAL ANGLE
R0145 (AZO) BETWEEN THE GREENWICH MERIDIAN AND THE REFERENCE X-Z PLANES IS ADDED. ADDING THE LONGITUDE YIELDS AZGR.

R0147 THE FOLLOWING COMPUTATIONS ARE THEN PERFORMED.

R0148 LOCAL VERTICAL(ER) = COS(LATITUDE), 0, SIN(LATITUDE) IN EARTH REFERENCE

R0149 LOCAL VERTICAL(IR) = COS(LAT)COS(AZGR), COS(LAT)SIN(AZGR), SIN(LAT) IN INERTIAL REFERENCE

R0151 LOCAL EAST(IR) = UNIT(NXV) = -SIN(AZGR), COS(AZGR), 0 IN INERTIAL REFERENCE

R0153 LOCAL SOUTH(IR) = E(IR) X V(IR)

R0154 THE RELATIONSHIP OF THE STABLE MEMBER AXES TO THE V, S, F AXES IS GIVEN BY ZSMAZ, THE ANGLE FROM NORTH
R0156 TO ZSM, AND TILT, THE ANGLE ABOUT ZSM FROM VERTICAL TO XSM.

R0157 ZSM(IR) = EAST(IR)SIN(ZSMAZ) - SOUTH(IR)COS(ZSMAZ)

R0158 YSM(IR) = (ZSM(IR) X V(IR))COS(TILT) - V(IR)SIN(TILT)

R0159 XSM(IR) = YSM(IR) X ZSM(IR)

R0160 THESE THREE HALF-UNIT VECTORS, XSM(IR), YSM(IR), AND ZSM(IR) ARE THE SM AXES EXPRESSED IN INERTIAL
R0162 REFERENCE COORDINATES AND THEY FORM REFSMMAT, THE REFERENCE TO STABLE MEMBER MATRIX.

R0164 THE INPUT (PRELAUNCH ERASABLE LOAD) REQUIREMENTS ARE:

R0165 1) TEPHEM THE TRIPLE PRECISION TIME IN CENTISECONDS FROM MIDNIGHT JULY 1, OF THE EPHEMERIS YEAR TO
R0167 MIDNIGHT OF THE LAUNCH DAY (SIDEREAL CONVERTED TO MEAN SOLAR.)

R0168 IT IS ASSUMED THAT DURING THE LAUNCH COUNTDOWN THE LGC CLOCK (TIME2, TIME1) WILL BE ALIGNED TO REFLECT A
R0170 ZERO VALUE AT MIDNIGHT OF THE LAUNCH DAY. IF NOT, THE DIFFERENCE MUST BE ADDED TO TEPHEM.

R0172 2) TILT THE ROTATION OF XSM ABOUT ZSM (RIGHT HAND RULE) FROM VERTICAL IN REVOLUTIONS.

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R0174 3) ZSMAZ THE ANGLE FROM NORTH TO ZSM IN REVOLUTIONS.

R0175 THE OUTPUTS OF THIS PROGRAM ARE:

R0176 1) REFSMMAT THE HALF-UNIT MATRIX WHICH TRANSFORMS FROM REFERENCE INERTIAL TO SM INERTIAL.

R0178 2) AZGR THE ANGLE BETWEEN PAD 37 3 VERTICAL AND THE REFERENCE X-Z PLANE IN REVOLUTIONS.

R0180 CALLING SEQUENCE : CONTINUATION OF MP2JOB
R0181 NORMAL EXIT MODE- TC ENDOFJOB

R0182 ALARM OR ABORT EXITS- NONE

R0183 DEBRIS- SPECIALS, CENTRALS AND EXECUTIVE WORK AREA.

```
0184                        27,2065  54345 1  MATRXJOB DLOAD   SR
0185  REF   4 LAST 676      27,2066  01344 0           TPREITER      MAKE ALIGN STOP TIME TP.
0186                        27,2067  20617 0           14D
0187                        27,2070  47171 0     TAD   RTB
0188  REF   1               27,2071  01754 0           TEPHEM        TP CS FROM JULY 1 TO LAUNCH DAY.
0189  REF   1               27,2072  33541 1           TPMODE        SET STORE MODE TO TRIPLE.
0190                        27,2073  00025 0     STORE 20D           TP CS FROM JULY 1 TO RELEASE.
0191                        27,2074  60335 1     SLOAD NORM
0192                        27,2075  00025 0           20D
0193  REF   3 LAST 457      27,2076  00047 1           X1            -9 OR -10.
0194                        27,2077  47005 1     DMP   RTB
0195  REF   1               27,2100  16346 1           WEARTH        REVS PER 2(28)CS.
0196  REF   7 LAST 442      27,2101  33520 0           SGNAGREE
0197                        27,2102  65257 1     SR*   PDDL
0198                        27,2103  20556 0           0 -19D,1      GETS RID OF WHOLE REVS.
0199                        27,2104  00026 0           21D
0200                        27,2105  47005 1     DMP   RTB
0201  REF   2 LAST 678      27,2106  16346 1           WEARTH
0202  REF   8 LAST 678      27,2107  33520 0           SGNAGREE
0203                        27,2110  43261 0     SLR   DAD
0204                        27,2111  21206 0           5             DP FRACTION OF A REV.
0205                        27,2112  43215 0     DAD   DAD
0206  REF   1               27,2113  01757 0           AZ0           MERIDIAN ANGLE AT JULY 1.
0207  REF   1               27,2114  01763 1           P37BIONG      PAD ANGLE TO MERIDIAN.
0208  REF   1               27,2115  01746 0     STORE AZGR          VERT. AZ. AT RELEASE WRT X-Z INERTIAL.

0209                        27,2116  77756 0     SIN
0210  REF   1               27,2117  15271 1     STODL REFSMMAT +6   SIN(AZGR).
0211  REF   2 LAST 678      27,2120  01746 0           AZGR
0212                        27,2121  77746 1     COS
0213  REF 273 LAST 654      27,2122  14150 0     STODL MPAC +3       Y OF EAST IN INERTIAL = COS(AZGR).
0214  REF   1               27,2123  01761 0           P37BIAT       LOCAL VERTICAL Z IN EARTH REF. SIN(L).
0215                        27,2124  77756 0     SIN
0216  REF   2 LAST 678      27,2125  15267 0     STODL REFSMMAT +4   ALSO LOCAL VERT Z IN REF. INERTIAL.
0217  REF   2 LAST 678      27,2126  01761 0           P37BIAT
```

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```
0218                        27,2127  72546 0        COS     SL1             SAVES 2 SL'S LATER.
0219                        27,2130  00025 0        STORE   20D             LOCAL VER. X IN EARTH REF.  COS(L).
0220                        27,2131  77605 1        DMP
0221  REF 274 LAST 678      27,2132  00150 0                MPAC +3
0222  REF   3 LAST 678      27,2133  15263 1        STODL   REFSMMAT        X OF VERT IN INERTIAL = COS(L)COS(AZGR).
0223  REF   4 LAST 679      27,2134  01271 1                REFSMMAT +6     SIN(AZGR).
0224                        27,2135  77605 1        DMP
0225                        27,2136  00025 0                20D
0226  REF   5 LAST 679      27,2137  15265 1        STODL   REFSMMAT +2     Y OF VERT IN INERTIAL = COS(L)SIN(AZGR).
0227  REF   1               27,2140  17103 0                DPZRO
0228  REF 275 LAST 679      27,2141  14152 1        STODL   MPAC +5         Z OF EAST IN INERTIAL = 0.
0229  REF   6 LAST 679      27,2142  01271 1                REFSMMAT +6     SIN(AZGR).
0230                        27,2143  47076 0        DCOMP   RTB             ALSO -X OF EAST IN INERTIAL.
0231  REF   2 LAST 363      27,2144  33516 0                VECMODE         SET STORE MODE TO VECTOR.
0232                        27,2145  47206 0        PUSH    VXV             INERTIAL EAST INTO PD.
0233  REF   7 LAST 679      27,2146  01263 1                REFSMMAT
0234                        27,2147  77656 1        UNIT                    INERTIAL SOUTH = UNIT(EXV).
0235  REF   8 LAST 679      27,2150  15277 1        STODL   REFSMMAT +12D   INTO REF +12D  (TEMP).
0236  REF   1               27,2151  01752 0                ZSMAZ           ZSM WRT NORTH.
0237                        27,2152  74346 0        COS     VXSC
0238  REF   9 LAST 679      27,2153  01277 1                REFSMMAT +12D   SOUTH(IR)COS(ZSMAZ).
0239  REF  10 LAST 679      27,2154  15277 1        STODL   REFSMMAT +12D   INTO REF +12D  (TEMP).
0240  REF   2 LAST 679      27,2155  01752 0                ZSMAZ
0241                        27,2156  74356 1        SIN     VXSC            EAST(IR)SIN(ZSMAZ).
0242                        27,2157  53451 1        VSJ     UNIT
0243  REF  11 LAST 679      27,2160  01277 1                REFSMMAT +12D   UNIT(ZSM) IN INERTIAL =
0244  REF  12 LAST 679      27,2161  01277 1        STORE   REFSMMAT +12D   EAST(IR)SIN(ZSMAZ) - SOUTH(IR)COS(ZSMAZ)

0245                        27,2162  53435 0        VXV     UNIT
0246  REF  13 LAST 679      27,2163  01263 1                REFSMMAT        YREFSM(UNTILTED)= Z CROSS VERT = Y1.
0247                        27,2164  71525 0        PDDL    COS             INTO PD.
0248  REF   1               27,2165  01750 1                TILT            TILT IS POS ABOUT ZSM FROM UNTILTED YSM.
0249                        27,2166  77761 1        VXSC
0250                        27,2167  73525 1        PDDL    SIN             (Y1)COS(T) INTO PD.
0251  REF   2 LAST 679      27,2170  01750 1                TILT
0252                        27,2171  51361 1        VXSC    BVSJ
0253  REF  14 LAST 679      27,2172  01263 1                REFSMMAT
0254                        27,2173  77656 1        UNIT
0255  REF  15 LAST 679      27,2174  01271 1        STORE   REFSMMAT +6     YREFSM = (Y1)COS(T) - (VERT)SIN(T).

0256                        27,2175  53435 0        VXV     UNIT
0257  REF  16 LAST 679      27,2176  01277 1                REFSMMAT +12D
0258  REF  17 LAST 679      27,2177  01263 1        STORE   REFSMMAT        XREFSM = Y CROSS Z.
0259                        27,2200  77776 1        EXIT

0260  REF  19 LAST 465      27,2201  0 4161 0       TC      PHASCHNG
0261                        27,2202  00004 0        OCT     00004           DEACTIVATE GROUP 4

0262  REF  55 LAST 674      27,2203  0 5567 0       TC      ENDOFJOB
```

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```
0263   REF   1                27,2204  0 5060 1  DFITMCAL TC     1LMP          MUST BE CALLED BY IBNKCALL (OR ISWCALL)
0264                          27,2205    00354 0            OCT    236             IN INTERRUPT OR INHIBITED
0265   REF   1                27,2206  3 2344 0            CA     12SEC
0266   REF  78 LAST 675       27,2207  0 5663 1            TC     WAITLIST      CALL DFITMCL1 IN 12 SECONDS
0267   REF  13 LAST 676                    E3               EBANK= TGRR
0268                          27,2210    02213 0            2CADR  DFITMCL1
C0268  REF   1                27,2211    56063 1
0269   REF   1                27,2212  1 5303 0            TCF    ISWRETRN

0270   REF   1                27,2213  0 5052 0  DFITMCL1 TC     2LMP
0271                          27,2214    00355 1            OCT    237           DFI T/M CALIBRATE OFF
0272                          27,2215    00306 1            OCT    198           MASTER C+W ALARM RESET - COMMAND
0273   REF  13 LAST 365       27,2216  0 5701 1            TC     FIXDELAY
0274                          27,2217    00310 0            OCT    200           DELAY 2 SECONDS

0275   REF   2 LAST 680       27,2220  0 5060 1  DFITMCL2 TC     1LMP
0276                          27,2221    00307 0            OCT    199           MASTER C+W ALARM RESET - COMMAND RESET
0277   REF  52 LAST 672       27,2222  1 5727 1            TCF    TASKOVER

0278   REF  13 LAST 472       27,2223  0 4117 1  LIFTOFF  TC     NEWMODEX      DISPLAY MAJOR MODE 11
0279                          27,2224    00011 1            OCT    11

0280   REF   1                27,2225  3 2444 1            CA     61OCT
0281   REF   5 LAST 461       27,2226  0 4246 0            TC     NEWPHASE      IMMEDIATE RESTART HERE
0282                          27,2227    00002 0            OCT    2

0283                          27,2230   22 007 0  REDO2.61 ZL                    THIS SECTION OF CODING ZEROES THE LGC
0284   REF  16 LAST 523       27,2231  4 7746 1            CS     HALF          CLOCK AND MAKES THE CORRESPONDING
0285                          27,2232  6 0000 1            DOUBLE               CORRECTION TO TBASE5 , SO THAT READACCS
0286   REF  14 LAST 670       27,2233  6 0025 0            AD     TIME1         IS NOT CALLED TOO SOON. THE NEW TBASE5
0287   REF   1                27,2234  27'123 1            ADS    TBASE5        IS OVERFLOW CORRECTED.

0288   REF 216 LAST 671       27,2235  3 7767 0            CA     ZERO
0289   REF  23 LAST 669       27,2236  52 025 1            DXCH   TIME2
0290   REF   1                27,2237  53'741 0            DXCH   TLIFTOFF      SAVE TIME OF LIFTOFF

0291   REF   1                27,2240  3 2445 0            CA     63OCT
0292   REF   6 LAST 680       27,2241  0 4246 0            TC     NEWPHASE      DO NOT REPEAT THE ABOVE
0293                          27,2242    00002 0            OCT    2

0294                          27,2243  0 0006 1  REDO2.63 EXTEND
0295   REF   2 LAST  66       27,2244  3 1744 1            DCA    DT=LFTJT
0296   REF   2 LAST  63       27,2245  0 5741 0            TC     LONGCALL
0297   REF  14 LAST 680                    E3               EBANK= TGRR
0298                          27,2246    02270 0            2CADR  POSTLET
C0298  REF   3 LAST  66       27,2247    56063 1
0299   REF   3 LAST 675       27,2250  0 4141 1            TC     2PHSCHNG
0300                          27,2251    00073 0            OCT    00073         RESTART POSTLET LONGCALL GROUP 3
0301                          27,2252    25012 0            OCT    25012         AND CONTINUE LIFTOFF (SET LONGBASE HERE)
0302                          27,2253    77777 0            OCT    77777
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```
 0307   REF   4 LAST 680    27,2254  0 4141 1            TC     2PHSCHNG
 0308                       27,2255   00002 0            OCT    2
 03085                      27,2256   47016 0            OCT    47016          PROTECT RCSPURGE.
 0309                       27,2257   24404 1            DEC    10500
 0310   REF  15 LAST 680                 E3             EBANK= TGRR
 0311                       27,2260   02264 0            2CADR  RCSPURGE
C0311   REF   1            27,2261   56063 1
 0312   REF  14 LAST 680    27,2262  0 5701 1            TC     FIXDELAY
 0313                       27,2263   24404 1            DEC    10500
 0314   REF   1            27,2264  3 2347 0 RCSPURGE   CA     +XJETSON
 0315                       27,2265  0 0006 1            EXTEND
 0316                       27,2266  01 005 0            WRITE  5              TURN ON +X TRANSLATION

 0317   REF  63 LAST 680    27,2267  1 5727 1            TCF    TASKOVER


 0318   REF  10 LAST 480    27,2270  4 0076 1 POSTLET    CS     FLAGWRD2       ENABLE ABORT COMMAND MONITOR
 0319   REF  15 LAST 599    27,2271  7 7753 0            MASK   BIT9           BIT 9  FLAGWORD 2
 0320   REF  11 LAST 681    27,2272   26 076 1           ADS    FLAGWRD2

 0321   REF  14 LAST 680    27,2273  0 4117 1            TC     NEWMODEX
 0322                       27,2274   00012 1            OCT    12             MAJOR MODE 12

 0323   REF  50 LAST 635    27,2275  3 7763 1            CA     BIT1
 0324   REF  79 LAST 680    27,2276  0 5663 1            TC     WAITLIST       ENABLE TUMBLE MONITOR
 0325   REF   1                          E6             EBANK= OMEGA
 0326                       27,2277   02470 0            2CADR  TUMTASK
C0326   REF   2 LAST  66     27,2300   60066 1
 0327   REF   5 LAST 681    27,2301  0 4141 1            TC     2PHSCHNG
 0328                       27,2302   00053 1            OCT    00053          RESTART TUMTASK GR 3
 0329                       27,2303   47012 1            OCT    47012
 0330                       27,2304   01750 1            DEC    1000
 0331   REF  16 LAST 681                 E3             EBANK= TGRR
 0332                       27,2305   02311 0            2CADR  MONBOOST
C0332   REF   1            27,2306   56063 1
 0333   REF  15 LAST 681    27,2307  0 5701 1            TC     FIXDELAY
 0334                       27,2310   01750 1            DEC    1000           WAIT 10 SECONDS FOR STAGING + SIVB IGN.

 0335   REF   1            27,2311  3 2343 1 MONBOOST   CA     BOOSTADR       MONITOR DELV FOR BOOSTER SHUTDOWN
 0336   REF   9 LAST 675    27,2312  55310 0            TS     DVSELECT

 0337   REF  20 LAST 679    27,2313  0 4161 0            TC     PHASCHNG
 0338                       27,2314   47012 1            OCT    47012
 0339                       27,2315   04064 1            DEC    2100
 0340   REF  17 LAST 681                 E3             EBANK= TGRR
 0341                       27,2316   02322 0            2CADR  PURGEOFF
C0341   REF   1            27,2317   56063 1
 0342   REF  16 LAST 681    27,2320  0 5701 1            TC     FIXDELAY
 0343                       27,2321   04064 1            DEC    2100           WAIT 21 SECONDS
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```
0344  REF 217 LAST 680   27,2322  3 7767 0  PURGEOFF  CA    ZERO
0345  REF   7 LAST 680   27,2323  0 4246 0            TC    NEWPHASE
0346                     27,2324    00006 1            OCT   6

0347  REF 218 LAST 682   27,2325  3 7767 0            CA    ZERO
0348                     27,2326  0 0006 1            EXTEND
0349                     27,2327  01 006 0            WRITE 6
0350                     27,2330  0 0006 1            EXTEND
0351                     27,2331  01 005 0            WRITE 5          TURN OFF RCS JETS

0352  REF   1            27,2332  0 5101 1            TC    1LMP.DT
0353                     27,2333    00272 0           DEC   186      ECS PRIMARY WATER VALVE OPEN

0354                     27,2334    00310 0           DEC   200      WAIT 2 SECONDS

0355  REF   3 LAST 680   27,2335  0 5060 1  WATEROFF  TC    1LMP
0356                     27,2336    00273 1           DEC   187      ECS PRIMARY WATER VALVE - OPEN RESET

0357  REF  21 LAST 681   27,2337  0 4161 0            TC    PHASCHNG
0358                     27,2340    00002 0           OCT   00002    DEACTIVATE GROUP 2

0359  REF  54 LAST 681   27,2341  1 5727 1            TCF   TASKOVER  END OF MISSION PHASE 2


A0360                                                             DELTA T S AND OTHER CONSTANTS FOR MP2
 0361 REF   1            27,2342    02251 0  AVEGADRS  GENADR  AVERAGEG
 0362 REF   1            27,2343    02273 0  BOOSTADR  GENADR  BOOSTMON
 0363 REF   1                       27,2442  SVEXADRS  EQUALS  SVEXITAD
 0364                    27,2344    02260 1  12SEC     DEC    1200
 0365                    27,2345    37116 0  WEARTH    2DEC   31,1639787 B-5  REVOLUTIONS PER 2(28) CENTISECONDS.
C0365                    27,2346    32623 1
 0366                    27,2347    00252 1  +XJETSON  OCT    00252    BITS FOR +X TRANSLATION JETS
A0367


A0368                                                             ABORT COMMAND MONITOR - DETECTS
A0369                                                             SUBORBITAL ABORT AND CONTINGENCY
A0370                                                             ORBIT INSERTION

 0371                    27,2350  0 0004 0  SUBABORT  INHINT
 0372 REF 219 LAST 682   27,2351  3 7767 0            CAF   ZERO     SUBORBITAL ABORT - ZERO ABORTNDX TO
 0373 REF   2 LAST 241   27,2352  1 2355 1            TCF   CONORBIT +2  SET UP MISSION PHASE 3

 0374                    27,2353  0 0004 0  CONORBIT  INHINT
 0375 REF  88 LAST 671   27,2354  3 7762 0            CAF   TWO      CONTINGENCY ORBIT INSERTION - ABORTNDX
 0376 REF 140 LAST 672   27,2355  54 001 1            TS    L        SET TO 2 TO SET UP MISSION PHASE 4
 0377 REF  12 LAST 681   27,2356  4 0076 1            CS    FLAGWRD2 SAVE IN L
                                                                    CHECK ABORT RECEIVED FLAG TO INSURE THAT
 0378 REF  41 LAST 599   27,2357  7 7752 1            MASK  BIT10    MULTIBLE TRANSMISSIONS DON'T START
```

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```
0379                        27,2360  0 0006 1          EXTEND                  MULTIBLE JOBS.  SINCE MULTIBLE XMISSIONS
0380   REF  56 LAST 679     27,2361  1 5567 1          BZF     ENDOFJOB        ARE THE RULE.  LEAVE WITH NO ALARM.
0381   REF  13 LAST 682     27,2362  4 0076 1          CS      FLAGWRD2        IS ABORT COMMAND MONITOR ENABLED

0382   REF  16 LAST 681     27,2363  7 7753 0          MASK    BIT9
0383                        27,2364  0 0006 1          EXTEND
0384   REF   1              27,2365  1 2371 1          BZF     SETABORT        YES.

0385   REF  38 LAST 671     27,2366  0 4755 1          TC      ALARM           ABORT NOT ENABLED.  SET ALARM AND EXIT.
0386                        27,2367   00300 1          OCT     00300
0387   REF  57 LAST 683     27,2370  0 5567 0          TC      ENDOFJOB

0388                        27,2371  0 0004 0 SETABORT INHINT
0389   REF   4 LAST 466     27,2372  3 5352 0          CA      EBANK3
0390   REF  43 LAST 675     27,2373   54 003 0         TS      EBANK
0391   REF   1              27,2374  23'742 1          LXCH    ABORTNDX        STORE ABORTNDX
0392   REF   2 LAST 675     27,2375  3 2342 0          CAF     AVEGADRS
0393   REF  10 LAST 681     27,2376  55'310 0          TS      DVSELECT        TURN OFF BOOSTMON
0394   REF   6 LAST 681     27,2377  0 4141 1          TC      2PHSCHNG
0395                        27,2400   00004 0          OCT     00004
0396                        27,2401   00006 1          OCT     00006
0397   REF   7 LAST 683     27,2402  0 4141 1          TC      2PHSCHNG
0398                        27,2403   00003 1          OCT     00003
0399                        27,2404   07022 0          OCT     07022
0400                        27,2405   21000 1          OCT     21000
0401   REF   2 LAST 683                 E3            EBANK=  ABORTNDX
0402                        27,2406   02414 1          2CADR   TJMBL3/4
C0402  REF   1              27,2407   56063 1
0403   REF   2 LAST 670     27,2410  0 6060 1          TC      FLAG2UP
0404                        27,2411   01000 0          OCT     01000           ABORT RECEIVED FLAG
0405   REF  39 LAST 671     27,2412  0 5225 1          TC      POSTJUMP
0406   REF   1              27,2413   02354 1          CADR    ENEMA           WIPE EVERYTHING OUT


0407                        27,2414  0 0004 0 TJMBL3/4 INHINT
0408   REF  51 LAST 681     27,2415  3 7763 1          CA      BIT1
0409   REF  30 LAST 681     27,2416  0 5663 1          TC      WAITLIST        RE-ESTABLISH TUMBLE MONITOR
0410   REF   2 LAST 681                 E6            EBANK=  OMEGA
0411                        27,2417   02470 0          2CADR   TJMTASK
C0411  REF   3 LAST 681     27,2420   60066 1
0412   REF   8 LAST 683     27,2421  0 4141 1          TC      2PHSCHNG
0413                        27,2422   00053 1          OCT     00053           3.5 SPOT FOR TUMTASK
0414                        27,2423   04022 0          OCT     04022           GR 2 FOR ABORT3/4

0415                        27,2424  0 0004 0 ABORT3/4 INHINT
0416   REF   4 LAST 325     27,2425  3 5651 0          CAF     PRIO27
0417   REF   1              27,2426   54 063 0         TS      NEWPRIO         SET UP MP3 OR MP4 VIA SPVAC

0418                        27,2427  0 0006 1          EXTEND
```

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```
0419  REF   3 LAST 683    27,2430  5 1742 1            INDEX   ABORTNDX     GET RIGHT 2CADR
0420  REF   1             27,2431  3 2435 1            DCA     MP3-4ADR
0421  REF   1             27,2432  0 5526 0            TC      SPVAC        SET UP ABORT JOB.

0422  REF  58 LAST 683    27,2433  1 5567 1            TCF     ENDOFJOB


0423  REF  37 LAST 324                    E4           EBANK=  TDEC
0424                      27,2434  02000 0 MP3-4ADR     2CADR   MP03JOB      DO NOT CHANGE THE ORDER OF THESE 2 CARDS
C0424 REF   1             27,2435  52064 1
0425  REF  38 LAST 684                    E4           EBANK=  TDEC
0426                      27,2436  02000 0              2CADR   MP4JOB       THEY ARE IN AN INDEXED TABLE
C0426 REF   1             27,2437  66064 0
0427  REF  39 LAST 684                    E4           EBANK=  TDEC         LEFT-OVERS FROM DELETED MISSION PHASE 18
0428                      27,2440  02341 0 MIDAVEAD     2CADR   MIDTOAVE
C0428 REF   1             27,2441  16064 1
0429  REF  40 LAST 684                    E4           EBANK=  TDEC
0430                      27,2442  02324 0 SVEXITAD     2CADR   SERVEXIT
C0430 REF   2 LAST 102    27,2443  60064 0


0431                      27,2444  00061 0 61OCT        DCT     61
0432                      27,2445  00063 1 63OCT        DCT     63
```

L MISSION PHASE 2 GUIDANCE REFERENCE RELEASE + BOOST MONITOR USER'S OWN PAGE NO. 13 S3 E3

```
P0433   SET UP & EXECUTE JOB TO ADD VELOCITY CORRECTION TO VN:

 0434   REF   6 LAST 472                    E5          EBANK= GTSWTLST

 0435   REF   2 LAST 160   27,2446  3 5643 0  LIFTFIXT  CA     PRIO17      LESS THAN PRELAUNCH OR NORMLIZE
 0436   REF  14 LAST 674   27,2447  0 5516 0            TC     FINDVAC
 0437   REF   3 LAST 454                    E5          EBANK= OLDGT
 0438               27,2450    02453 1                 2CADR  LIFTFIX
C0438   REF   1           27,2451    56065 1
 0439   REF  55 LAST 682   27,2452  0 5727 0            TC     TASKOVER


 0440   REF   1           27,2453  4 1307 0  LIFTFIX   CS     PIPTIME +1  PRELAUNCH BY NOW HAS FOUND THE SRR FLAG
 0441   REF   4 LAST 685   27,2454  6 1743 0            AD     OLDGT       & SUBSEQUENTLY BEEN THRU PREREAD, VIA
 0442               27,2455  0 0006 1                 EXTEND             MP2TASK.
 0443               27,2456  6 2461 0                 BZMF   +3
 0444   REF   7 LAST 631   27,2457  6 7744 1            AD     NEG1/2      (IF TIME1 OVERFLOWED)
 0445   REF   8 LAST 685   27,2460  6 7744 1            AD     NEG1/2
 0446   REF 276 LAST 679   27,2461  54 147 1            TS     MPAC +3

 0447   REF  57 LAST 676   27,2462  0 6112 0            TC     INTPRET

 0448               27,2463    56335 1                 SLOAD  DDV
 0449   REF 277 LAST 685   27,2464    00150 0                 MPAC +3
 0450   REF   1           27,2465    16503 0                 -1SEC214   MAKE THE TIME-RATIO POSITIVE.
 0451               27,2466    63361 0                 VXSC   PDVL
 0452   REF   1           27,2467    01025 1                 GDT/2
 0453   REF   3 LAST 472   27,2470    00404 1                 DELV
 0454               27,2471    76455 1                 VAD    VSL1
 0455   REF   3 LAST 472   27,2472    01765 1                 DELVSUF
 0456               27,2473    53361 0                 VXSC   VAD
 0457   REF   1           27,2474    21165 0                 XPIP1
 0458               27,2475    77655 1                 VAD
 0459   REF   4 LAST 337   27,2476    01017 0                 VN
 0460   REF   5 LAST 685   27,2477    01017 0                 STORE  VN

 0461               27,2500    77776 1                 EXIT
 0462   REF  59 LAST 684   27,2501  0 5567 0            TC     ENDOFJOB


 0463               27,2502    77633 1  -1SEC214 2DEC  -100 B-14
C0463               27,2503    77777 0
```

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```
0001                                25,2000          BANK  25
0002    REF  41 LAST 684              E4             EBANK= TDEC


R0003   PROGRAM DESCRIPTION- MISSION PHASE 3 - SUBORBITAL ABORT                DATE- 28 OCT 66
R0005   MOD NO- 0                                                            LOG SECTION- MP 3 - SUBORBITAL ABORT
R0007   MOD BY- GILBERT                                                      ASSEMBLY- SUNBURST REVISION 17

R0009   FUNCTIONAL DESCRIPTION
R0010           IN THE FIRST 10 SECONDS OF THIS PHASE, THE GROUND IS CAUSING THE NOSECONE TO BE JETTISONED AND THE SLA
R0012   PANELS TO BE DEPLOYED. 10 SECONDS AFTER RECEIPT OF THE ABORT COMMAND, MP3 CHECKS TUMBLING AND PROCEEDS ONLY
R0014   WHEN THE INDICATED TUMBLING RATES ARE LESS THAN 3 DEGREES PER SECOND. MP3 THEN STARTS +X TRANSLATION AND
R0016   COMMANDS SIVB/LEM SEPARATION. 13 SECONDS AFTER SEPARATION THE DESCENT ENGINE IS TURNED ON FOR 5 SECONDS, THEN
R0018   IGNITED AGAIN AFTER A 5 SECOND COAST AND LEFT ON THROUGH THE ABORT STAGE COMMAND WHICH IS SENT/RECEIVED 31
R0020   SECONDS LATER. THE APS ENGINE IS TURNED OFF 5 SECONDS AFTER ABORT STAGE, THEN IGNITED AGAIN AFTER A 30 SECOND
R0022   COAST FOR A FINAL 60 SECOND BURN. IMU COMPENSATION CONTINUES THROUGHOUT THIS MISSION PHASE.

R0024   CALLING SEQUENCE
R0025       SUBORBITAL ABORT IS STARTED AT THE DISCRETION OF THE GROUND IN THE EVENT OF AN ABORT DURING THE EARLIER PART
R0027   OF BOOST. KEY CODE 23 IS SENT VIA UPLINK.

R0028   SUBROUTINES CALLED
R0029       NEWMODEX, WAITLIST, FIXDELAY, 1LMP, 2LMP, 1LMP+DT, 2LMP+DT, FLAG1DWN, ENGINEON, ENGINOFF, ENGINOF1, PREREAD,
R0031   READACCS, SERVICER, AVERAGEG.

R0032   NORMAL EXIT MODES
R0033       TASKOVER.

R0034   ALARM OR ABORT EXIT MODES
R0035       MAJOR MODE 71.

R0036   INPUT
R0037       DVSELECT SET FOR READACCS AND SERVICER

R0038   OUTPUT
R0039       "LAST RITES"

R0040   ERASABLE INITIALIZATION REQUIRED
R0041       KEY CODE 23 SENT VIA UPLINK.

R0042   DEBRIS
R0043       CENTRALS = A,L,Q
R0044       OTHER    = ERASABLES IN SUBROUTINES USED
```

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```
 0045   REF  15 LAST 681    25,2000  0 4117 1  MP03J03  TC     NEWMODEX     DISPLAY MAJOR MODE 71
 0046                       25,2001   00071 1            OCT    71

 00465  REF  34 LAST 671    25,2002  3 6311 1            CAF    THREE
 00466  REF   6 LAST 676    25,2003  54 764 0            TS     PHASENUM

 0047   REF  22 LAST 682    25,2004  0 4161 0            TC     PHASCHNG
 0048                       25,2005   47012 1            OCT    47012
 0049                       25,2006   00001 0            DEC    1
 0050   REF  42 LAST 686                E4               EBANK= IDEC
 0051                       25,2007   02021 0            2CADR  SBORB1
C0051   REF   1            25,2010   52064 1
 00515  REF  21 LAST 545    25,2011  3 7761 0            CAF    BIT3
 00516  REF   3 LAST 675    25,2012  0 4105 1            TC     SETRSTRT     SET RESTART FLAG

 0052                       25,2013  0 0004 0            INHINT
 0053   REF 148 LAST 672    25,2014  3 7763 1            CAF    ONE          10 MS. - CONTINUE UNDER WAITLIST CONTROL
 0054   REF  31 LAST 683    25,2015  0 5663 1            TC     WAITLIST
 0055   REF  43 LAST 687                E4               EBANK= IDEC
 0056                       25,2016   02021 0            2CADR  SBORB1
C0056   REF   2 LAST 687    25,2017   52064 1
 0057   REF  70 LAST 685    25,2020  1 5567 1            TCF    ENDOFJOB     AND RELINT

 0061   REF 220 LAST 682    25,2021  3 7767 0  SBORB1    CAF    ZERO         INSURE RCS JETS OFF
 00613                      25,2022  0 0006 1            EXTEND
 00616                      25,2023  01 006 0            WRITE  6
 0062                       25,2024  0 0006 1            EXTEND
 0063                       25,2025  01 005 0            WRITE  5

 0064   REF  23 LAST 687    25,2026  0 4161 0            TC     PHASCHNG
 0065                       25,2027   47012 1            OCT    47012
 0066                       25,2030   00144 0            DEC    100
 0067   REF  44 LAST 687                E4               EBANK= IDEC
 0068                       25,2031   02035 0            2CADR  SBORB2
C0068   REF   1            25,2032   52064 1
 0069   REF  17 LAST 681    25,2033  0 5701 1            TC     FIXDELAY     WAIT 1 SECOND
 0070                       25,2034   00144 0            DEC    100

 0071   REF   1            25,2035  0 5073 0  SBORB2    TC     2LMP.DT
 0072                       25,2036   00274 0            DEC    188          RCS MAIN S/O VALVES, SYS. A - OPEN **
 0073                       25,2037   00276 1            DEC    190          RCS MAIN S/O VALVES, SYS. B - OPEN **
 0074                       25,2040   00144 0            DEC    100          WAIT 1 SECOND

 0075   REF   2 LAST 682    25,2041  0 5101 1            TC     1LMP.DT
 0076                       25,2042   00004 0            DEC    4            ED BATTERY ACTIVATION - ON *
 0077                       25,2043   00144 0            DEC    100          WAIT 1 SECOND

 0078   REF   2 LAST 687    25,2044  0 5073 0            TC     2LMP.DT
 0079                       25,2045   00275 1            DEC    189          RESET **
 0080                       25,2046   00277 0            DEC    191          RESET **
```

L MP 3 = SUBORBITAL ABORT USER'S OWN PAGE NO. 3 S3 E4

```
0081                        25,2047   00144 0          DEC   100          WAIT 1 SECOND

0082  REF   3 LAST 687      25,2050   0 5101 1         TC    1LMP*DT
0083                        25,2051   00006 1          DEC   6            RCS PRESSURIZE - FIRE **
0084                        25,2052   00144 0          DEC   100          WAIT 1 SECOND

0085  REF   4 LAST 688      25,2053   0 5101 1         TC    1LMP*DT
0086                        25,2054   00005 1          DEC   5            ED BATTERY ACTIVATION - SAFE *
0087                        25,2055   00144 0          DEC   100          WAIT 1 SECOND

0088  REF   5 LAST 688      25,2056   0 5101 1         TC    1LMP*DT
0089                        25,2057   00007 0          DEC   7            RESET **
0090                        25,2060   00620 0          DEC   400          WAIT 4 SECONDS

0091  REF  18 LAST 516      25,2061   4 0075 1  TJMBCHK CS    FLAGWRD1     IS VEHICLE RATE LESS THAN 3 DEG/SEC
0092  REF  25 LAST 608      25,2062   7 7747 0         MASK  BIT13
0093  REF 287 LAST 671      25,2063   10 000 0         CCS   A
0094  REF   1               25,2064   1 2070 0         TCF   TUMB1        YES

0095  REF  18 LAST 687      25,2065   0 5701 1         TC    FIXDELAY     WAIT .5 SECONDS
0096                        25,2066   00062 0          DEC   50

0097  REF   1               25,2067   1 2061 0         TCF   TUMBCHK

0098  REF  24 LAST 687      25,2070   0 4161 0  TJMB1  TC    PHASCHNG
0099                        25,2071   05012 1          OCT   05012
0100                        25,2072   77777 0          OCT   77777

0101  REF   7 LAST 431      25,2073   0 6067 0         TC    FLAG1DWN     TERMINATE TUMBLE MONITOR
0102                        25,2074   20000 0          OCT   20000

0105  REF   1               25,2075   3 3014 1         CAF   JETS+X      COMMAND +X TRANSLATION - ON (4 JET)
0106                        25,2076   0 0006 1         EXTEND
0107                        25,2077   01 005 0         WRITE 5
0108  REF  24 LAST 669      25,2100   0 5270 1         TC    IBNKCALL
0109  REF   1               25,2101   40062 1          CADR  JLLAGE       USE LATER

0110  REF   6 LAST 688      25,2102   0 5101 1         TC    1LMP*DT
0111                        25,2103   00072 1          DEC   58           LEM/S4B SEPARATE ARM - ON *
0112                        25,2104   00062 0          DEC   50           WAIT 500 MILLISECONDS

0113  REF  53 LAST 632      25,2105   4 0077 0         CS    DAPBOOLS     ENABLE DAP
0114  REF   6 LAST 556      25,2106   7 7751 1         MASK  GODABGO
0115  REF  54 LAST 688      25,2107   26 077 0         ADS   DAPBOOLS

0116  REF  25 LAST 688      25,2110   0 5270 1         TC    IBNKCALL     DEADBAND SELECT - MAX
0117  REF   3 LAST 102      25,2111   40054 1          CADR  SETMAXDB

01175 REF  25 LAST 688      25,2112   0 4161 0         TC    PHASCHNG
01176                       25,2113   47012 1          OCT   47012
```

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```
 01177                          25,2114   00062 0          DEC   50
 01178  REF  45 LAST 687                 E4               EBANK= TDEC
 01179                          25,2115   02121 1          2CADR TJMB5
C01179  REF   1                25,2116   52064 1
  0118  REF  19 LAST 688        25,2117   0 5701 1         TC    FIXDELAY     WAIT 500 MILLISECONDS
  0119                          25,2120   00062 0          DEC   50

  0120  REF  26 LAST 688        25,2121   0 5270 1 TJMB2   TC    IBNKCALL
  0121  REF   1                25,2122   40072 0          CADR  SETRATE      HOLD VEHICLE ATTITUDE RATE

  0125  REF   3 LAST 687        25,2123   0 5073 0         TC    2LMP+DT
  0126                          25,2124   00132 1          DEC   90           LEM/S4B SEPARATE - COMMAND **
  0127                          25,2125   00004 0          DEC   4            ED BATTERY ACTIVATION - ON *
  0128                          25,2126   00012 1          DEC   10           WAIT 100 MILLISECONDS

  0129  REF  27 LAST 689        25,2127   0 5270 1         TC    IBNKCALL     DEADBAND SELECT - MIN
  0130  REF   2 LAST 670        25,2130   40046 1          CADR  SETMINDB

 01304  REF  19 LAST 688        25,2131   4 0075 1         CS    FLAGWRD1     SETS SIVBGONE TO 1
 01305  REF  38 LAST 613        25,2132   7 7760 0         MASK  BIT4
 01306  REF  20 LAST 689        25,2133   26 075 1         ADS   FLAGWRD1

013065  REF  26 LAST 688        25,2134   0 4161 0         TC    PHASCHNG
 013066                         25,2135   47012 1          OCT   47012
 013067                         25,2136   00132 1          DEC   90
 013068  REF  46 LAST 689                 E4               EBANK= TDEC
 013069                         25,2137   02143 0          2CADR TJMB3
C013069  REF   1                25,2140   52064 1
  0131  REF  20 LAST 689        25,2141   0 5701 1         TC    FIXDELAY     WAIT 900 MILLISECONDS
  0132                          25,2142   00132 1          DEC   90

  0133  REF  28 LAST 689        25,2143   0 5270 1 TJMB3   TC    IBNKCALL
 01335  REF   2 LAST 481        25,2144   40277 1          CADR  ENGINOF1

  0134  REF   4 LAST 689        25,2145   0 5073 0         TC    2LMP+DT
  0135                          25,2146   00073 0          DEC   59           LEM/S4B SEPARATE ARM - OFF *
  0136                          25,2147   00226 1          DEC   150          ENGINE SELECT - DESC ARM *
  0137                          25,2150   00001 0          DEC   1            WAIT 10 MILLISECONDS

  0138  REF  42 LAST 682        25,2151   3 7752 0         CAF   BIT10        START ABORT STAGE DISCRETE MONITOR
  0139  REF  32 LAST 687        25,2152   0 5663 1         TC    WAITLIST
  0140  REF  47 LAST 689                 E4               EBANK= TDEC
  0141                          25,2153   02436 1          2CADR ABTSTGDM
C0141   REF   1                25,2154   52064 1
  0142  REF   9 LAST 683        25,2155   0 4141 1         TC    2PHSCHNG
  0143                          25,2156   40072 0          OCT   40072
  0144                          25,2157   47016 0          OCT   47016
  0145                          25,2160   01000 0          DEC   512
  0146  REF  48 LAST 689                 E4               EBANK= TDEC
  0147                          25,2161   02436 1          2CADR ABTSTGDM
C0147   REF   2 LAST 689        25,2162   52064 1
```

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```
0148  REF  29 LAST 689   25,2163  0 5270 1  S3ORBA  TC     IBNKCALL      DEADBAND SELECT - MIN
0149  REF   3 LAST 689   25,2164   40046 1          CADR   SETMINDB

0150  REF   7 LAST 688   25,2165  0 5101 1          TC     1LMP+DT
0151                     25,2166   00126 1          DEC    86            MANUAL THROTTLE - ON (10 PC) *
0152                     25,2167   00144 0          DEC    100           WAIT 1 SECOND

0153  REF   8 LAST 690   25,2170  0 5101 1          TC     1LMP+DT
0154                     25,2171   00133 0          DEC    91            RESET **
0155                     25,2172   01130 1          DEC    600           WAIT 6 SECONDS

0156  REF  30 LAST 690   25,2173  0 5270 1          TC     IBNKCALL      HOLD LEM ATTITUDE
0157  REF   5 LAST 515   25,2174   40114 1          CADR   STOPRATE
0166  REF  27 LAST 689   25,2175  0 4161 0          TC     PHASCHNG
0167                     25,2176   47012 1          OCT    47012
0168                     25,2177   00620 0          DEC    400
0169  REF   9 LAST 676                E5           EBANK=  DVCNTR
0170                     25,2200   02204 0          2CADR  S3ORB3
C0170 REF   1            25,2201   52065 0
0171  REF  21 LAST 689   25,2202  0 5701 1          TC     FIXDELAY      WAIT 4 SECONDS
0172                     25,2203   00620 0          DEC    400

0173  REF  10 LAST 690                E5           EBANK=  DVCNTR

01732 REF   6 LAST 675   25,2204  3 5661 0  S3ORB3  CA     EBANK5
01734 REF  44 LAST 683   25,2205   54 003 0          TS     EBANK

01736 REF   9 LAST 690   25,2206  0 5101 1          TC     1LMP+DT
0174                     25,2207   00010 0          DEC    8             LANDING GEAR DEPLOY - FIRE **
0175                     25,2210   00144 0          DEC    100           WAIT 1 SECOND

0176  REF  31 LAST 690   25,2211  0 5270 1          TC     IBNKCALL
01765 REF   1            25,2212   40226 0          CADR   DPSENGON

0177  REF  28 LAST 690   25,2213  0 4161 0          TC     PHASCHNG
0178                     25,2214   47012 1          OCT    47012
0179                     25,2215   00144 0          DEC    100
0180  REF  11 LAST 690                E5           EBANK=  DVCNTR
0181                     25,2216   02222 1          2CADR  S3ORB4
C0181 REF   1            25,2217   52065 0
0182  REF  22 LAST 690   25,2220  0 5701 1          TC     FIXDELAY      WAIT 1 SECOND
0183                     25,2221   00144 0          DEC    100

0184  REF   5 LAST 689   25,2222  0 5073 0  S3ORB4  TC     2LMP+DT
0185                     25,2223   00005 1          DEC    5             ED BATTERY ACTIVATION - SAFE *
0186                     25,2224   00011 1          DEC    9             RESET **
0187                     25,2225   00620 0          DEC    400           WAIT 4 SECONDS

01872 REF 221 LAST 687   25,2226  3 7767 0          CA     ZERO          WE WANT TO DETECT ENGINOFF QUICKLY SO IT
01874 REF   2 LAST 480   25,2227   55'341 1         TS     SETDVCNT      WON'T INTERFERE WITH NEXT ENG ON.
```

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```
01876  REF 149 LAST 687     25,2230  3 7763 1          CA    ONE          DITTO.
01878  REF  12 LAST 690     25,2231  55511 1           TS    DVCNTR

0188   REF  32 LAST 690     25,2232  0 5270 1          TC    IBNKCALL
01885  REF   4 LAST 586     25,2233  40263 1           CADR  ENGINOFF

0189   REF  29 LAST 690     25,2234  0 4161 0          TC    PHASCHNG
0190                        25,2235  47012 1           OCT   47012
0191                        25,2236  00764 1           DEC   500
0192   REF  13 LAST 691                 E5            EBANK= DVCNTR
0193                        25,2237  02243 0           2CADR SBORR5
C0193  REF   1              25,2240  52065 0
0194   REF  23 LAST 690     25,2241  0 5701 1          TC    FIXDELAY     WAIT 5 SECONDS
0195                        25,2242  00764 1           DEC   500

0196   REF  33 LAST 691     25,2243  0 5270 1 S3ORB5   TC    IBNKCALL
01965  REF   2 LAST 690     25,2244  40226 0           CADR  DPSENGON     DPSENGON WILL REFRESH SETDVCNT

0197   REF  30 LAST 691     25,2245  0 4161 0          TC    PHASCHNG
0198                        25,2246  47012 1           OCT   47012
0199                        25,2247  00310 0           DEC   200
0200   REF  14 LAST 691                 E5            EBANK= DVCNTR
0201                        25,2250  02254 0           2CADR SBORR6
C0201  REF   1              25,2251  52065 0
0202   REF  24 LAST 691     25,2252  0 5701 1          TC    FIXDELAY     WAIT 2 SECONDS
0203                        25,2253  00310 0           DEC   200

0204   REF  34 LAST 691     25,2254  0 5270 1 S3ORB6   TC    IBNKCALL     COMMAND +X TRANSLATION - OFF (4 JET)
0205   REF   2 LAST 102     25,2255  40066 0           CADR  NOJLIAGE

0206   REF  31 LAST 691     25,2256  0 4161 0          TC    PHASCHNG
0207                        25,2257  47012 1           OCT   47012
0208                        25,2260  03554 0           DEC   1900
0209   REF  15 LAST 691                 E5            EBANK= DVCNTR
0210                        25,2261  02265 1           2CADR SBORR7
C0210  REF   1              25,2262  52065 0
0211   REF  25 LAST 691     25,2263  0 5701 1          TC    FIXDELAY     WAIT 19 SECONDS
0212                        25,2264  03554 0           DEC   1900

0213   REF  10 LAST 690     25,2265  0 5101 1 S3ORB7   TC    1LMP+DT
0214                        25,2266  00336 1           DEC   222          ASCENT WATER COOLANT VALVE - OPEN **
0215                        25,2267  00310 0           DEC   200          WAIT 2 SECONDS

0216   REF  11 LAST 691     25,2270  0 5101 1          TC    1LMP+DT
0217                        25,2271  00337 0           DEC   223          RESET **
0218                        25,2272  00454 1           DEC   300          WAIT 3 SECONDS

0219   REF   7 LAST 481     25,2273  3 5210 1          CAF   PRIJ30       THRUST REQUEST DURING JOB
0220   REF  15 LAST 685     25,2274  0 5516 0          TC    FINDVAC
0221   REF  11 LAST  67                 E5            EBANK= ETHROT
```

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```
 0222                          25,2275   02464 0          2CADR  TRST90PC
C0222  REF   1                 25,2276   52065 0
 0224  REF  10 LAST 689        25,2277   0 4141 1         TC     2PHSCHNG
 0225                          25,2300   40112 1          OCT    40112
 02255                         25,2301   07024 0          OCT    07024
 0226                          25,2302   30000 1          OCT    30000
 0227  REF  12 LAST 691                      E5           EBANK= ETHROT
 0228                          25,2303   02464 0          2CADR  TRST90PC
C0228  REF   2 LAST 692        25,2304   52065 0
 0229  REF  26 LAST 691        25,2305   0 5701 1         TC     FIXDELAY      WAIT 4 SECONDS
 0230                          25,2306   00620 0          DEC    400

 0231  REF  12 LAST 691        25,2307   0 5101 1  S3ORB8 TC     1LMP+DT
 0232                          25,2310   00046 0          DEC    38            ABORT STAGE - ARM *
 0233                          25,2311   00144 0          DEC    100           WAIT 1 SECOND

 0234  REF  13 LAST 692        25,2312   0 5101 1         TC     1LMP+DT
 0235                          25,2313   00026 0          DEC    22            ABORT STAGE - COMMAND *
 0236                          25,2314   00001 0          DEC    1             WAIT 10 MS

 0237  REF  32 LAST 691        25,2315   0 4161 0         TC     PHASCHNG
 0238                          25,2316   00002 0          OCT    00002

 0239  REF  56 LAST 685        25,2317   1 5727 1         TCF    TASKOVER      ABORT STAGE DISCRETE MONITOR RUNNING


 02441 REF   1                                 E7         EBANK= LEMMASS2
 02442 REF   1                 25,2320   3 5662 0  S3ORBB CAF    EBANK7
 02443 REF  45 LAST 690        25,2321   54 003 0         TS     EBANK

 02444                         25,2322   0 0006 1         EXTEND
 02445 REF   2 LAST 692        25,2323   3 1777 1         DCA    LEMMASS2
 02446 REF   5 LAST 614        25,2324   53 321 1         DXCH   MASS

 024461 REF 35 LAST 691        25,2325   0 5270 1         TC     IBNKCALL      SET UP DAP FOR APS BURN
 024462 REF  1                 25,2326   40175 0          CADR   APSENGON

 02447 REF  49 LAST 689                        E4         EBANK= TDEC
 02448 REF   2 LAST 675        25,2327   3 7751 0         CAF    EBANK4
 02449 REF  46 LAST 692        25,2330   54 003 0         TS     EBANK

 024493 REF 33 LAST 692        25,2331   0 4161 0         TC     PHASCHNG
 024494                        25,2332   47012 1          OCT    47012
 024495                        25,2333   00144 0          DEC    100
 024496 REF 50 LAST 692                        E4         EBANK= TDEC
 024497                        25,2334   02340 1          2CADR  S3ORB9
C024497 REF  1                 25,2335   52064 1
 0245  REF  27 LAST 692        25,2336   0 5701 1         TC     FIXDELAY      WAIT 1 SECOND
 0246                          25,2337   00144 0          DEC    100
```

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```
0247   REF  14 LAST 692    25,2340  0 5101 1  S3ORB9   TC     1LMP+DT
0248                       25,2341   00227 0            DEC    151          ENGINE SELECT - DESC ARM OFF *
0249                       25,2342   00620 0            DEC    400          WAIT 4 SECONDS

0250   REF  36 LAST 692    25,2343  0 5270 1            TC     IBNKCALL
02505  REF   5 LAST 691    25,2344   40263 1            CADR   ENGINOFF

0251   REF  34 LAST 692    25,2345  0 4161 0            TC     PHASCHNG
0252                       25,2346   47012 1            OCT    47012
0253                       25,2347   00144 0            DEC    100
0254   REF  51 LAST 692                 E4              EBANK= TDEC
0255                       25,2350   02354 1            2CADR  S3ORB10
C0255  REF   1             25,2351   52064 1
0256   REF  28 LAST 692    25,2352  0 5701 1            TC     FIXDELAY     WAIT 1 SECOND
0257                       25,2353   00144 0            DEC    100

0258   REF   6 LAST 690    25,2354  0 5073 0  S3ORB10   TC     2LMP+DT
0259                       25,2355   00047 1            DEC    39           ABORT STAGE - COMMAND RESET *
02595                      25,2356   00206 0            DEC    134          ENGINE SELECT - ASC ARM *
0260                       25,2357   05214 0            DEC    2700         WAIT 27 SECONDS

0261   REF  37 LAST 693    25,2360  0 5270 1            TC     IBNKCALL     COMMAND +X TRANSLATION - ON (4 JET)
0262   REF   2 LAST 688    25,2361   40062 1            CADR   JLLAGE

0263   REF  35 LAST 693    25,2362  0 4161 0            TC     PHASCHNG
0264                       25,2363   47012 1            OCT    47012
0265                       25,2364   00310 0            DEC    200
0266   REF  52 LAST 693                 E4              EBANK= TDEC
0267                       25,2365   02371 0            2CADR  S3ORB11
C0267  REF   1             25,2366   52064 1
0268   REF  29 LAST 693    25,2367  0 5701 1            TC     FIXDELAY     WAIT 2 SECONDS
0269                       25,2370   00310 0            DEC    200

0270   REF  38 LAST 693    25,2371  0 5270 1  S3ORB11   TC     IBNKCALL
02705  REF   2 LAST 692    25,2372   40175 0            CADR   APSENGON

0271   REF  36 LAST 693    25,2373  0 4161 0            TC     PHASCHNG
0272                       25,2374   47012 1            OCT    47012
0273                       25,2375   00310 0            DEC    200
0274   REF  53 LAST 693                 E4              EBANK= TDEC
0275                       25,2376   02402 0            2CADR  S3ORB12
C0275  REF   1             25,2377   52064 1
0276   REF  30 LAST 693    25,2400  0 5701 1            TC     FIXDELAY     WAIT 2 SECONDS
0277                       25,2401   00310 0            DEC    200

0278   REF  39 LAST 693    25,2402  0 5270 1  S3ORB12   TC     IBNKCALL     COMMAND +X TRANSLATION - OFF (4 JET)
0279   REF   3 LAST 691    25,2403   40066 0            CADR   NOJLLAGE

0280   REF  37 LAST 693    25,2404  0 4161 0            TC     PHASCHNG
0281                       25,2405   47012 1            OCT    47012
```

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```
0282                          25,2406   13250 1          DEC     5800
0283   REF  54 LAST 693               E4                EBANK=  TDEC
0284                          25,2407   02413 0          2CADR   SBORB13
C0284  REF   1                25,2410   52064 1
0285   REF  31 LAST 693       25,2411   0 5701 1         TC      FIXDELAY      WAIT 58 SECONDS
0286                          25,2412   13250 1          DEC     5800

0287   REF  40 LAST 693       25,2413   0 5270 1 SBORB13 TC      IBNKCALL
02875  REF   6 LAST 693       25,2414   40263 1          CADR    ENGINOFF

0288   REF  38 LAST 693       25,2415   0 4161 0         TC      PHASCHNG
0289                          25,2416   47012 1          OCT     47012
0290                          25,2417   00144 0          DEC     100
0291   REF  55 LAST 694               E4                EBANK=  TDEC
0292                          25,2420   02424 1          2CADR   SBORB14
C0292  REF   1                25,2421   52064 1
0293   REF  32 LAST 694       25,2422   0 5701 1         TC      FIXDELAY      WAIT 1 SECOND
0294                          25,2423   00144 0          DEC     100

0295   REF  15 LAST 693       25,2424   0 5101 1 SBORB14 TC      ILMP+DT
0296                          25,2425   00207 1          DEC     135           ENGINE SELECT - ASC ARM OFF *
0297                          25,2426   05524 1          DEC     2900          WAIT 29 SECONDS

0298   REF   8 LAST 688       25,2427   0 6067 0         TC      FLAGUPDWN     KNOCK DOWN AVERAGEG FLAG
0299                          25,2430   00001 0          OCT     00001

0300   REF  41 LAST 694       25,2431   0 5270 1         TC      IBNKCALL      DEADBAND SELECT - MAX
0301   REF   4 LAST 688       25,2432   40054 1          CADR    SETMAXDB

0302   REF  39 LAST 694       25,2433   0 4161 0         TC      PHASCHNG
0303                          25,2434   00002 0          OCT     00002

0304   REF  57 LAST 692       25,2435   0 5727 0         TC      TASKOVER


0305   REF  29 LAST 675       25,2436   3 7762 0 ABTSTGDM CAF    BIT2          ABORT STAGE DISCRETE MONITOR
0306                          25,2437   0 0006 1         EXTEND
0307                          25,2440   02 030 0         RAND    30

0308                          25,2441   0 0006 1         EXTEND
0309   REF   1                25,2442   1 2446 1         BZF     ABTSTG1       YES

0310   REF  33 LAST 694       25,2443   0 5701 1         TC      FIXDELAY      WAIT .5 SECONDS
0311                          25,2444   00062 0          DEC     50

0312   REF   3 LAST 689       25,2445   1 2436 0         TCF     ABTSTGDM

0313   REF  11 LAST 692       25,2446   0 4141 1 ABTSTG1 TC      2PHSCHNG
0314                          25,2447   00004 0          OCT     00004
```

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```
 0315                          25,2450   47012 1            OCT   47012
 0316                          25,2451   77777 0            OCT   77777
 03165  REF  56 LAST 694                     E4            EBANK= TDEC
 0317                          25,2452   02320 1            2CADR SBORAB
C0317   REF   1               25,2453   52064 1
 03175  REF  12 LAST 694      25,2454 0 4141 1             TC    2PHSCHNG
 03176                         25,2455   00006 1            OCT   00006
 03177                         25,2456   00003 1            OCT   00003

 0318   REF   4 LAST 556      25,2457   3 5660 1           CAF   PRIO37      GENERATE RESTART IMMEDIATELY
 0319   REF  20 LAST 556      25,2460   0 5505 1           TC    NOVAC
 03195  REF  30 LAST 524                     E3            EBANK= LST1
 0320                          25,2461   02354 1            2CADR ENEMA
C0320   REF   2 LAST 683      25,2462   02063 0
 0321   REF  58 LAST 694      25,2463   1 5727 1           TCF   TASKOVER


 032102 REF  38 LAST 629      25,2464   3 7743 0  TRST90PC CAF   POSMAX      INCREASE THROTTLE 90 PERCENT
 032104 REF   1               25,2465   55323 0           TS    PCNTF
 032106                       25,2466   0 0006 1          EXTEND
 032108 REF   1               25,2467   3 2473 0          DCA   THRSTLOC
 03211  REF  19 LAST 628      25,2470   52 006 0          DXCH  Z

 032116 REF  71 LAST 687      25,2471   1 5567 1          TCF   ENDOFJOB


 0322   REF  13 LAST 692                     E5            EBANK= ETHROT
 0323                          25,2472   03466 0  THRSTLOC 2CADR PCNTFMAX
C0323   REF   1               25,2473   60065 1
```

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 0001                                33,2000          BANK  33

 0002  REF  57 LAST 695                  E4           EBANK= TDEC
R0003  PROGRAM NAME-                  DATE-
R0004          MISSION PHASE 4 .                 14 DECEMBER 1966
R0005  MOD NO- 21                   LOG SECTION-
R0006  MOD BY- SCHULENBERG                       MP4-CONTINGENCY ORBIT INSERTION

R0007  FUNCTIONAL DESCRIPTION-
R0008          CONTINGENCY ORBIT INSERTION IS CALLED BY GROUND IN EVENT OF PREMATURE SIVB SHUTDOWN AND ATTEMPTS TO
R0010  EFFECT AN ORBITAL INSERTION USING THE DPS ENGINE AND THE GUIDANCE EQUATIONS USED FOR THE APS BURNS. THE
R0012  PROGRAM LEAVES MISSION PHASE TIMERS INHIBITED AND LEAVES FURTHER CONTROLTO THE GROUND VIA UPLINK.
R0014  CALLING SEQUENCE-              SUBROUTINES CALLED-
R0015          START MP4 WHEN ABORT            FLAG1UP          FLAG1DWN
R0016  COMMAND MONITOR DETECTS MP4             FIXDELAY         WAITLIST
R0017  COMMAND VIA LGC UPLINK                  VPATCHER         CALCMANU
R0018                                          ASCENT           UL4JETON
R0019  NORMAL EXIT MODES-                      LMP              UL4JETOF
R0020          TASKOVER (AWAITS                EXECUTIVE        ENGINEON
R0021  FURTHER COMMANDS FROM GROUND)           MIDTOAVE         ENGINOFF
R0022  ALARM EXIT MODES-                       BANKCALL         ENGINOF1
R0023          NONE                            IBNKCALL         LASTBIAS

R0024  ERASABLE INITIALIZATION REQUIRED-
R0025          RINJECT = INJECTION RADIUS DESIRED IN METERS * 2(-25)
R0252          VINJECT = ORBITAL VELOCITY DESIRED IN METERS/CENTISECOND * 2(-7

R0026  OUTPUT- SAME AS FOR CALCMANU
R0027  DEBRIS- SAME AS FOR CALCMANU

 0028  REF  40 LAST 694     33,2000  0 4161 0  MP4JOB   TC     PHASCHNG
 00285                      33,2001   05022 1            OCT    05022
 0029                       33,2002   27000 1            OCT    27000

 00291 REF  39 LAST 689     33,2003  3 7760 1            CAF    BIT4
 00292 REF   4 LAST 687     33,2004  0 4105 1            TC     SETRSTRT       SET RESTART FLAG

 00295 REF   5 LAST 674     33,2005  0 6051 0            TC     FLAG1UP
 0030                       33,2006   00040 0            OCT    00040          POOH FLAG ON

 0031  REF  16 LAST 687     33,2007  0 4117 1            TC     NEWMODEX       START CONTINGENCY ORBIT INSERTION
 0032                       33,2010   00072 1            OCT    72

 0033  REF  21 LAST 618     33,2011  3 7761 0            CAF    FOUR           SIGNAL START OF MISSION PHASE 4
 0034  REF   7 LAST 687     33,2012  54 764 0            TS     PHASENUM

 0035  REF   9 LAST 694     33,2013  0 6067 0            TC     FLAG1DWN       TERMINATE AVEG AND DO AUTO AVETOMID
 0036                       33,2014   00001 0            OCT    1

 0037                       33,2015  0 0004 0            INHINT
```

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```
 0038   REF  52 LAST 683     33,2016  3 7763 1          CAF     BIT1
 0039   REF  33 LAST 689     33,2017  0 5663 1          TC      WAITLIST        SHORT WAITLIST TO INITIALIZE LMP COMMAND
 0040   REF  58 LAST 696                 E4             EBANK=  TDEC
 0041                        33,2020  02023 1           2CADR   ABORTPRR
C0041   REF   1              33,2021  66064 0
 0042   REF  72 LAST 695     33,2022  1 5567 1          TCF     ENDOFJOB        END MP4JOB

R0043   RCS ABORT PRESSURIZATION ROUTINE

 0044   REF 222 LAST 690     33,2023  3 7767 0  ABORTPRR CAF     ZERO            INSURE RCS JETS OFF
 00444                       33,2024  0 0006 1          EXTEND
 00446                       33,2025  01 006 0          WRITE   6
 0045                        33,2026  0 0006 1          EXTEND
 0046                        33,2027  01 005 0          WRITE   5

 0047   REF  41 LAST 696     33,2030  0 4161 0          TC      PHASCHNG
 0048                        33,2031  47012 1           OCT     47012
 0049                        33,2032  00144 0           DEC     100
 0050   REF  59 LAST 697                 E4             EBANK=  TDEC
 0051                        33,2033  02037 1           2CADR   OPESYS
C0051   REF   1              33,2034  66064 0
 0052   REF  34 LAST 694     33,2035  0 5701 1          TC      FIXDELAY
 0053                        33,2036  00144 0           DEC     100             DELAY ONE SECOND

 0054   REF   7 LAST 693     33,2037  0 5073 0  OPESYS  TC      2LMP.DT
 0055                        33,2040  00274 0           DEC     188             RCS MAIN S/O VALVES, SYS A-OPEN**
 0056                        33,2041  00276 1           DEC     190             RCS MAIN S/O VALVES, SYS B-OPEN**
 0057                        33,2042  00144 0           DEC     100             DELAY ONE SECOND

 0058   REF  16 LAST 694     33,2043  0 5101 1          TC      1LMP.DT
 0059                        33,2044  00004 0           DEC     4               ED BATTERY ACTIVATION-ON
 0060                        33,2045  00144 0           DEC     100             DELAY ONE SECOND

 0061   REF   8 LAST 697     33,2046  0 5073 0          TC      2LMP.DT
 0062                        33,2047  00275 1           DEC     189             RCS MAIN S/O VALVES, SYS A-OPEN RESET
 0063                        33,2050  00277 0           DEC     191             RCS MAIN S/O VALVES, SYS B-OPEN RESET
 0064                        33,2051  00144 0           DEC     100             DELAY ONE SECOND

 0065   REF  17 LAST 697     33,2052  0 5101 1          TC      1LMP.DT
 0066                        33,2053  00006 1           DEC     6               RCS PRESSURE-FIRE**
 0067                        33,2054  00144 0           DEC     100             DELAY ONE SECOND

 0068   REF  18 LAST 697     33,2055  0 5101 1          TC      1LMP.DT
 0069                        33,2056  00005 1           DEC     5               ED BATTERY ACTIVATION-SAFE
 0070                        33,2057  00144 0           DEC     100             DELAY ONE SECOND

 0071   REF  19 LAST 697     33,2060  0 5101 1          TC      1LMP.DT
 0072                        33,2061  00007 0           DEC     7               RCS PRESSURE - FIRE RESET
 0073                        33,2062  00620 0           DEC     400             DELAY FOUR SECONDS
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L       MP4=CONTINGENCY ORBIT INSERTION                                 USER'S OWN PAGE NO.  3          53  E4

R0074   END RCS ABORT PRESSURIZATION ROUTINE

 0075   REF  21 LAST 689      33,2063  3 0075 0  TJMBLCHK CA     FLAGWRD1
 0076   REF  26 LAST 688      33,2064  7 7747 0           MASK   BIT13
 0077                         33,2065  0 0006 1           EXTEND
 0078   REF   1               33,2066  1 2077 1           BZF    NOTJMBL

 0079   REF  42 LAST 697      33,2067  0 4161 0           TC     PHASCHNG
 0080                         33,2070   47012 1           OCT    47012
 0081                         33,2071   00062 0           DEC    50
 0082   REF  50 LAST 697                E4                EBANK= TDEC
 0083                         33,2072   02063 0           2CADR  TUMBLCHK
C0083   REF   1               33,2073   66064 0
 0084   REF  35 LAST 697      33,2074  0 5701 1           TC     FIXDELAY
 0085                         33,2075   00062 0           DEC    50              DELAY .5 SECS AND CHECK AGAIN
 0086   REF   2 LAST 698      33,2076  1 2063 1           TCF    TUMBLCHK

 0087   REF  10 LAST 696      33,2077  0 6067 0  NOTUMBL  TC     FLAGDWN         IF NO TUMBLING-TERMINATE MONITOR
 0088                         33,2100   20000 0           OCT    20000           TERMINATE TUMBLE MONITOR

 0091                         33,2101  0 0006 1  TIG4-51  EXTEND
 0092   REF  24 LAST 680      33,2102  3 0025 0           DCA    TIME2           GET CURRENT TIME
 0093   REF   6 LAST  67      33,2103   53'305 1          DXCH   TDECTEMP

 0094   REF   1               33,2104  3 2613 1           CAF    O21CFK          UPDATE STATE TO TIG4=30
 0095   REF 141 LAST 682      33,2105   54 001 1          TS     L
 0096   REF 223 LAST 697      33,2106  3 7767 0           CAF    ZERO
 0097   REF   7 LAST 698      33,2107   21'305 1          DAS    TDECTEMP

 0098                         33,2110  0 0006 1           EXTEND
 0099   REF   8 LAST 698      33,2111  3 1305 0           DCA    TDECTEMP
 0100   REF   2 LAST 336      33,2112   53'670 0          DXCH   TIGN
 0101   REF   1               33,2113  3 2614 0           CAF    O30CFK
 0102   REF 142 LAST 698      33,2114   56 001 0          XCH    L
 0103   REF 224 LAST 698      33,2115  3 7767 0           CAF    ZERO
 0104   REF   3 LAST 698      33,2116   21'670 0          DAS    TIGN            FOR DOWNLINK USE - NOMINAL TIGN
R0105   BEGIN ABORT LEM/S4B SEPARATION PROCEDURE

 0106   REF  22 LAST 698      33,2117  4 0075 1  MP4SEP   CS     FLAGWRD1
 0107   REF  40 LAST 696      33,2120  7 7760 0           MASK   BIT4
 0108   REF  23 LAST 698      33,2121   26 075 1          ADS    FLAGWRD1

 0109   REF   1               33,2122  3 2615 1           CAF    XTRANSON        +X TRANSLATION- ON (PRE-DAP)
 0110                         33,2123  0 0006 1           EXTEND
 0111                         33,2124   01 005 0          WRITE  5

 0112   REF  42 LAST 694      33,2125  0 5270 1           TC     IBNKCALL        +X TRANSLATION-ON (4JET)
 0113   REF   3 LAST 693      33,2126   40062 1          CADR   JLLAGE

 0114   REF  20 LAST 697      33,2127  0 5101 1           TC     ILMP+DT
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 0115                        33,2130   00072 1          DEC    58          LEM/SIVB SEPARATE - ARM ON
 0116                        33,2131   00062 0          DEC    50          DELAY 500 MS.

 0117  REF  55 LAST 688      33,2132   4 0077 0         CS     DAPBOOLS
 0118  REF   7 LAST 688      33,2133   7 7751 1         MASK   BODAPGO     TURN ON THE DAP
 0119  REF  56 LAST 699      33,2134   26 077 0         ADS    DAPBOOLS

 0120  REF  43 LAST 698      33,2135   0 5270 1         TC     IBNKCALL
 0121  REF   5 LAST 694      33,2136   40054 1          CADR   SETMAXDB

 0122  REF  43 LAST 698      33,2137   0 4161 0         TC     PHASCHNG
 0123                        33,2140   47012 1          OCT    47012
 01235                       33,2141   00062 0          DEC    50
 0124  REF  51 LAST 698                     E4          EBANK= TDEC
 0125                        33,2142   02146 0          2CADR  MP4HOLD
C0125  REF   1               33,2143   66064 0
 0126  REF  36 LAST 698      33,2144   0 5701 1         TC     FIXDELAY    WAIT FOR 300 MS.
 0127                        33,2145   00062 0          DEC    50          DELAY 500 MS.

 0128  REF  44 LAST 699      33,2146   0 5270 1 MP4HOLD TC     IBNKCALL
 0129  REF   2 LAST 476      33,2147   40072 0          CADR   HOLDRATE

 0130  REF  21 LAST 698      33,2150   0 5101 1         TC     1LMP,DT
 0131                        33,2151   00132 1          DEC    90          LEM/SIVB SEPARATE- COMMAND
 0132                        33,2152   00012 1          DEC    10          DELAY 100 MS.

 0133  REF  45 LAST 699      33,2153   0 5270 1         TC     IBNKCALL
 0134  REF   4 LAST 690      33,2154   40046 1          CADR   SETMINDB

 0135  REF  44 LAST 699      33,2155   0 4161 0         TC     PHASCHNG
 0136                        33,2156   47012 1          OCT    47012
 0137                        33,2157   00132 1          DEC    90
 0138  REF  52 LAST 699                     E4          EBANK= TDEC
 0139                        33,2160   02164 0          2CADR  TIG4-49
C0139  REF   1               33,2161   66064 0
 0140  REF  37 LAST 699      33,2162   0 5701 1         TC     FIXDELAY
 0141                        33,2163   00132 1          DEC    90          DELAY 900 MS.

 0142  REF  22 LAST 699      33,2164   0 5101 1 TIG4-49 TC     1LMP,DT
 0143                        33,2165   00073 0          DEC    59          LEM/S4B SEPARATE-ARM-OFF
 0144                        33,2166   00144 0          DEC    100         DELAY ONE SECOND

 0145  REF   4 LAST 682      33,2167   0 5060 1 TIG4-48 TC     1LMP
 0146                        33,2170   00133 0          DEC    91          LEM/S4B SEPARATE-COMMAND RESET

R0147  END LEM/S4B SEPARATION ROUTINE

 0148  REF   1               33,2171   3 2612 0         CAF    007CFK
 0149  REF  34 LAST 697      33,2172   0 5663 1         TC     WAITLIST
 0150  REF  53 LAST 699                     E4          EBANK= TDEC
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0151                          33,2173   02351 1          2CADR   TIG4-41
C0151  REF   2 LAST  64       33,2174   66064 0
0152   REF  13 LAST 695       33,2175   0 4141 1         TC      2PHASCHNG
0153                          33,2176   40152 0          OCT     40152          TABLES RESTART FOR TIG4-41
0154                          33,2177   05014 1          OCT     05014
0155                          33,2200   77777 0          OCT     77777

0156   REF   5 LAST 683       33,2201   3 5651 0         CAF     PRIO27         START NEW JOB FOR CALCULATIONS
0157   REF  16 LAST 691       33,2202   0 5516 0         TC      FINDVAC
0158   REF  54 LAST 699                 E4               EBANK=  TDEC
0159                          33,2203   02206 1          2CADR   LONGJOB
C0159  REF   1                33,2204   66064 0
0160   REF  59 LAST 695       33,2205   1 5727 1         TCF     TASKOVER       END TIG4-48 TASK

0161   REF  58 LAST 685       33,2206   0 6112 0  LONGJOB TC     INTPRET        SET INTEGRSW SO THAT THE THIRD TESTLOOP
0162                          33,2207   77414 0          SET     EXIT           OF MIDTOAVE WILL GENERATE IGN+28 STATES
0163   REF   1                33,2210   02072 0                  INTEGRSW       INSTEAD OF IGNITION STATES.

01631                         33,2211   0 0006 1         EXTEND                 RESET TDEC IN CASE OF A RESTART
01632  REF   9 LAST 698       33,2212   3 1305 0         DCA     TDECTEMP
01633  REF  55 LAST 700       33,2213   53,567 0         DXCH    TDEC

0164                          33,2214   0 0006 1         EXTEND
0165   REF   1                33,2215   3 2654 1         DCA     ORBINTAD       DO ORBITAL INTEGRATION
0166   REF  20 LAST 695       33,2216   52 006 0         DXCH    Z

01665  REF  45 LAST 699       33,2217   0 4161 0         TC      PHASCHNG
01667                         33,2220   05024 1          OCT     05024
01669                         33,2221   27000 1          OCT     27000

0167   REF   1                33,2222   3 2661 1  PRECOI CAF     KALC4AD
0168   REF   1                33,2223   55,450 0         TS      ASCRET
0169   REF  59 LAST 700       33,2224   0 6112 0         TC      INTPRET
0170                          33,2225   77624 1          CALL
0171   REF   1                33,2226   60436 0                  VPATCHER       RESCALE AND LOAD IGN STATES IN RN AND VN
01712                         33,2227   77776 1          EXIT

01713  REF  46 LAST 700       33,2230   0 4161 0         TC      PHASCHNG       BECAUSE PAXIS1 & QAXIS TIME-SHARE
01714                         33,2231   04024 0          OCT     04024          LOCATIONS WITH RN & VN.

01715  REF  50 LAST 700       33,2232   0 6112 0         TC      INTPRET
0172                          33,2233   77775 1          VLOAD
0173   REF   6 LAST 685       33,2234   01017 0                  VN             VN FROM VPATCHER=VIGNTION*2(-7) M/CS
0174                          33,2235   53435 0          VXV     UNIT
0175   REF   4 LAST 337       33,2236   01011 0                  RN             RN FROM VPATCHER=RIGNTION*2(-29) M
0176   REF   1                33,2237   26007 1          STOVL   QAXIS          UNIT HORIZONTAL VECTOR NORMAL TO ORBIT
0177   REF   1                33,2240   01033 0                  UNITR          UNITR FROM AVEG=UNIT(RIGNTION)*2(-1) M
0178   REF   1                33,2241   02001 1          STORE   PAXIS1
0179                          33,2242   76435 1          VXV     VSL1
0180   REF   2 LAST 700       33,2243   02007 1                  QAXIS
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0181  REF  1                33,2244  26015 1          STODL  SAXIS     UNIT HORIZONTAL VECTOR PARALLEL TO ORBIT
0182  REF  1                33,2245  26617 0                 ABLOCK
0183  REF  1                33,2246  26023 1          STODL  AT
0184  REF  1                33,2247  26625 1                 BBLOCK
0185  REF  4 LAST  39       33,2250  26031 1          STODL  ATMEAS
0186  REF  1                33,2251  26643 1                 CBLOCK
0187  REF  1                33,2252  16041 0          STODL  RDOTD     RDOTD, YDOTD,  ZDOTD FIXED LATER.
0188  REF  1                33,2253  26635 0                 KRIFST
0189  REF  1                33,2254  16037 1          STODL  KR1       LOAD ATTITUDE LIMITING PARAMETER
0190  REF  1                33,2255  26637 1                 TGOFST
0191  REF  1                33,2256  16141 1          STODL  TGO
0192  REF  1                33,2257  03572 1                 VTO-DPS
0193  REF  1                33,2260  16057 1          STODL  VTO       LOAD DPS TAILOFF VELOCITY FOR ASCENT
0194  REF  1                33,2261  03436 0                 RINJFCT
0195  REF  2 LAST 326       33,2262  16375 1          STODL  RCO       LOAD INJECTION RADIUS FOR ASCENT
0196  REF  1                33,2263  03440 1                 VINJFCT
0197  REF  1                33,2264  16045 1          STODL  ZDOTD     LOAD INJECTION VELOCITY FOR ASCENT
01971 REF  1                33,2265  26633 0                 KREST
01972 REF  1                33,2266  02061 1          STORE  KR
0198                        33,2267  77614 1          CLEAR
0199  REF  1                33,2270  02267 0                 DIRECT
0200                        33,2271  50375 0          VLOAD  DOT
0201  REF  2 LAST 701       33,2272  02015 1                 SAXIS
0202  REF  7 LAST 700       33,2273  01017 0                 VN               ZDOT*2(-8)
0203                        33,2274  77752 1          SL1                     *2(-7)
0204  REF  1                33,2275  26105 1          STOVL  ZDOT
0205  REF  2 LAST 700       33,2276  02001 1                 PAXIS1
0206                        33,2277  72441 0          DOT    SL1       RDOT*2(-8)
0207  REF  8 LAST 701       33,2300  01017 0                 VN                *2(-7)
0208  REF  1                33,2301  16147 1          STODL  RDOT
0209  REF  1                33,2302  26643 1                 DPO
0210  REF  1                33,2303  02067 1          STORE  YDOT      YDOT = 0
0211                        33,2304  52014 0          SET    GOTO
0212  REF  1                33,2305  02066 0                 BASTG4
0213  REF  1                33,2306  64125 0                 ASCENT    GO TO USE GEFF SECTION OF ASCENT
0214                        33,2307  77742 0  GFKNOWN SR1               LET AVG GEFF = .5 GEFF
0215  REF  1                33,2310  02111 1          STORE  GEFF
0216                        33,2311  77650 1          GOTO
0217  REF  1                33,2312  64404 0                 GAIN
0218                        33,2313  43345 1  TKNOWN  DLOAD  DAD
0219  REF  2 LAST 701       33,2314  02041 0                 RDOTD
0220  REF  2 LAST 701       33,2315  02147 1                 RDOT      (RDOT+RDOTD)*2(-7)
0221                        33,2316  41342 1          SR1    DMP        .5RDOTAVE*2(-7)
0222  REF  2 LAST 701       33,2317  02141 1                 TGO       RGO*2(-24),SINCE TGO IS *2(-17)
0223                        33,2320  70415 0          DAD    SR1       RFREE IS RCO FOR NO R-CONTROL,*2(-24)
0224  REF  1                33,2321  01047 0                 RMAG       *2(-25)
0225                        33,2322  51025 1          DSU    BPL
0226  REF  3 LAST 701       33,2323  02375 1                 RCO
0227  REF  1                33,2324  66330 1                 FREE_R
0228                        33,2325  52014 0          CLEAR  GOTO      IF RFREE SMTHAN RCO, CONSTRAIN RCO
```

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```
0229  REF   1                33,2326   02271 1                    HC
0230  REF   2 LAST 701       33,2327   64125 0                    ASCENT
0231                         33,2330   52014 0  FREE-R    SET     GOTO
0232  REF   2 LAST 702       33,2331   02071 0                    HC          IF RFREE GRTHAN RCO, FREE RCO
0233  REF   3 LAST 702       33,2332   64125 0                    ASCENT
0234                         33,2333.  43175 0  PREKALC4  VLOAD   CLEAR
0235  REF   1                33,2334   02233 1                    AXISD
0236  REF   1                33,2335   02273 0                    ENGOFFSW    TO AVOID MULTIPLE ENGINOFF COMMANDS
0237  REF   2 LAST 645       33,2336   25656 0                    STOVL       POINTVSM    KALCMANU INPUT REGISTER
0238  REF   1                33,2337   26641 0                    BODYVECT    LOAD BODY AXES VECTOR IN SM COORDS
0239  REF   5 LAST 645       33,2340   01664 1                    STORE       SCAXIS      KALCMANU INPUT VECTOR
0240                         33,2341   66214 0                    SET         SSP
0241                         33,2342   01063 0                    330

0242  REF   3 LAST 666       33,2343   01653 0                    RATEINDX
0243                         33,2344   00006 1                    6           10 DEGREE/SEC MANEUVERING RATE
0244                         33,2345   77776 1                    EXIT

02443 REF  47 LAST 700       33,2346   0 4161 0                   TC          PHASCHNG
02445                        33,2347    00004 0                   OCT         00004       DEACTIVATE GR 4

0245  REF  73 LAST 697       33,2350   1 5567 1                   TCF         ENDOFJOB    END LONGJOB

0246  REF   1                33,2351   3 2646 1  TIG4-41  CAF     AVGENADR    GENADR OF AVERAGEG
0247  REF  11 LAST 683       33,2352   55,310 0                   TS          DVSELECT

0248                         33,2353   0 0006 1                   EXTEND
0249  REF   1                33,2354   3 2652 1                   DCA         EXITADR     SET AVEG TO EXIT TO END OF JOB UNTIL
0250  REF   6 LAST 675       33,2355   53'073 0                   DXCH        AVGEXIT     IT IS RESET TO ATMAG

0251                         33,2356   0 0006 1                   EXTEND
0252  REF   1                33,2357   3 2650 0                   DCA         MP4TMIAD    SET MONITOR EXIT
0253  REF   5 LAST 675       33,2360   53'075 0                   DXCH        DVMNEXIT

0254  REF  23 LAST 699       33,2361   0 5101 1                   TC          ILMP+DT
0255                         33,2362    00004 0                   DEC         4           ED BATTERY ACTIVATION-ON
0256                         33,2363    00620 0                   DEC         400         DELAY 4 SECONDS

0257  REF  46 LAST 699       33,2364   0 5270 1  TIG4-37  TC      IBNKCALL    +X TRANSLATION- OFF
0258  REF   4 LAST 693       33,2365    40066 0                   CADR        NOJLIAGE

0259  REF  47 LAST 702       33,2366   0 5270 1                   TC          IBNKCALL
0260  REF   6 LAST 690       33,2367    40114 1                   CADR        STOPRATE    HOLD VEHICLE ATTITUDE

0261  REF  48 LAST 702       33,2370   0 4161 0                   TC          PHASCHNG
0262                         33,2371    47012 1                   OCT         47012
0263                         33,2372    00144 0                   DEC         100
0264  REF  56 LAST 700                      E4                   EBANK=      TDEC
0265                         33,2373    02377 0                   2CADR       TIG4-36
C0265 REF   1                33,2374    66064 0
```

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```
0266  REF  38 LAST 699   33,2375  0 5701 1          TC     FIXDELAY
0267                     33,2376   00144 0          DEC    100          DELAY ONE SECOND

0268  REF   5 LAST 699   33,2377  0 5060 1  TIG4-36  TC     1LMP
0269                     33,2400   00010 0          DEC    8            LANDING GEAR DEPLOY-FIRE

0270  REF   1            33,2401  3 2606 0          CAF    Q02CFK
0271  REF  85 LAST 699   33,2402  0 5663 1          TC     WAITLIST
0272  REF  57 LAST 702                E4           EBANK= TDEC
0273                     33,2403   02416 0          2CADR  TIG4-34
C0273 REF   2 LAST  64   33,2404   66064 0
0274  REF  14 LAST 700   33,2405  0 4141 1          TC     2PHSCHNG
0275                     33,2406   40172 1          OCT    40172
0276                     33,2407   05013 0          OCT    05013        GR 3 FOR KALCMANU
02765                    33,2410   77777 0          OCT    77777

0277  REF   5 LAST 311   33,2411  3 5642 1          CAF    PRIO16       CALL KALCMANU.
0278  REF  17 LAST 700   33,2412  0 5516 0          TC     FINDVAC
0279  REF  20 LAST 668                E3           EBANK= MIS
0280                     33,2413   02001 1          2CADR  VECPOINT
C0280 REF   1            33,2414   70063 0
0281  REF  70 LAST 700   33,2415  1 5727 1          TCF    TASKOVER     END TIG4-36 TASK

0282  REF   1            33,2416  3 2610 1  TIG4-34  CAF    Q04CFK       SET PREREAD CALL (AUTO LASTBIAS)
0283  REF  36 LAST 703   33,2417  0 5663 1          TC     WAITLIST
0284  REF   3 LAST  69                E5           EBANK= DVTOTAL
0285                     33,2420   02000 0          2CADR  PREREAD
C0285 REF   5 LAST  69   33,2421   60065 1
0286  REF  15 LAST 703   33,2422  0 4141 1          TC     2PHSCHNG
0287                     33,2423   40275 0          OCT    40275        5.27 SPOT FOR PREREAD
0288                     33,2424   05012 1          OCT    05012        GR 2 CONTINUES HERE
0289                     33,2425   77777 0          OCT    77777

0291  REF  24 LAST 702   33,2426  0 5101 1          TC     1LMP+DT
0292                     33,2427   00011 1          DEC    9            LANDING GEAR DEPLOY- FIRE RESET
0293                     33,2430   00622 1          DEC    402          DELAY 4 SECONDS

0294  REF  48 LAST 702   33,2431  0 5270 1  TIG4-30  TC     IBNKCALL
0295  REF   3 LAST 689   33,2432   40277 1          CADR   ENGINOF1

0296  REF   9 LAST 697   33,2433  0 5073 0          TC     2LMP+DT
0297                     33,2434   00226 1          DEC    150          ENGINE SELECT- DESC ARM
0298                     33,2435   00126 1          DEC    86           MANUAL THROTTLE- ON 10 PERCENT
0299                     33,2436   02566 0          DEC    1398         DELAY 14 SECONDS

0300  REF  10 LAST 703   33,2437  0 5073 0  TIG4-16  TC     2LMP+DT
0301                     33,2440   00344 1          DEC    228          DPS PQGS ARM NO 1 - ENABLE
0302                     33,2441   00304 0          DEC    196          DPS PQGS ARM NO 2- ENABLE
0303                     33,2442   00144 0          DEC    100
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```
 0304   REF  11 LAST 703    33,2443  0 5073 0  TIG4-15  TC      2LMP.DT
 0305                       33,2444    00364 0           DEC     244          DPS PGGS NO 1- ON
 0306                       33,2445    00324 1           DEC     212          DPS PGGS NO 2- ON
 0307                       33,2446    01356 0           DEC     750          DELAY 7.5 SECONDS

 0310   REF  49 LAST 703    33,2447  0 5270 1  TIG4-7.5 TC      IBNKCALL     +X TRANSLATION- ON
 0311   REF   4 LAST 698    33,2450    40062 1           CADR    JLLAGE

 0312   REF  49 LAST 702    33,2451  0 4161 0           TC      PHASCHNG
 0313                       33,2452    47012 1           OCT     47012
 0314                       33,2453    01356 0           DEC     750
 0315   REF  58 LAST 703                 E4              EBANK=  TDEC
 0316                       33,2454    02460 1           2CADR   TIG4TST
C0316   REF   1            33,2455    66064 0
 0317   REF  39 LAST 703    33,2456  0 5701 1           TC      FIXDELAY
 0318                       33,2457    01356 0           DEC     750          DELAY 7.5 SECONDS

 0319   REF   3 LAST 685    33,2460  3 5643 0  TIG4TST  CAF     PRIO17
 0320   REF  21 LAST 695    33,2461  0 5505 1           TC      NOVAC
 0321   REF  59 LAST 704                 E4              EBANK=  TDEC
 0322                       33,2462    02465 1           2CADR   IGNTEST
C0322   REF   1            33,2463    66064 0
 0323   REF  71 LAST 703    33,2464  1 5727 1           TCF     TASKOVER

 0326   REF 122 LAST 471    33,2465  0 5206 0  IGNTEST  TC      BANKCALL     WAIT UNTIL MANEUVER IS FINISHED
 0327   REF   1            33,2466    26743 0           CADR    ATTSTALL
 0328   REF   1            33,2467  0 4743 0           TC      CURTAINS

 0329                       33,2470  0 0004 0  MP4IGN   INHINT
 0330   REF  50 LAST 704    33,2471  0 5270 1           TC      IBNKCALL
 0331   REF   3 LAST 691    33,2472    40226 0           CADR    DPSENGON <

 0332   REF   1            33,2473  3 2607 1           CAF     003CEK
 0333   REF  87 LAST 703    33,2474  0 5663 1           TC      WAITLIST
 0334   REF  70 LAST 704                 E4              EBANK=  TDEC
 0335                       33,2475    02506 0           2CADR   MP4IGN+3
C0335   REF   1            33,2476    66064 0
 0336   REF  16 LAST 703    33,2477  0 4141 1           TC      2PHSCHNG
 03365                      33,2500    00003 1           OCT     00003
 0337                       33,2501    47012 1           OCT     47012
 0338                       33,2502    00454 1           DEC     300
 0339   REF  71 LAST 704                 E4              EBANK=  TDEC
 0340                       33,2503    02506 0           2CADR   MP4IGN+3
C0340   REF   2 LAST 704    33,2504    66064 0
 0341   REF  74 LAST 702    33,2505  1 5567 1           TCF     ENDOFJOB

 0342   REF  51 LAST 704    33,2506  0 5270 1  MP4IGN+3 TC      IBNKCALL     +X TRANSLATION- OFF
 0343   REF   5 LAST 702    33,2507    40066 0           CADR    NOUNLAGE

 0344   REF  25 LAST 703    33,2510  0 5101 1           TC      1LMP.DT
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0345                        33,2511  00005 1          DEC   5          ED BATTERY ACTIVATION- SAFE
0346                        33,2512  04374 0          DEC   2300       DELAY 23 SECONDS

0347  REF  39 LAST 695     33,2513  3 7743 0 MAXTHRST CAF   POSMAX     CALL FOR 92.5 PERCENT THRUST
0348  REF   2 LAST 695     33,2514  55'323 0         TS    PCNTF
0349                        33,2515  0 0006 1         EXTEND
0350  REF   1               33,2516  3 2656 0         DCA   PCNTFMAD
0351                        33,2517  52 006 0         DTCB

0352  REF  17 LAST 704     33,2520  0 4141 1         TC    2PHSCHNG   PROTECT CALL FOR MAXIMUM THRUST
03525                       33,2521  00114 0          DCT   00114
0353                        33,2522  47012 1          DCT   47012
0354                        33,2523  00454 1          DEC   300
0355  REF  72 LAST 704                    E4         EBANK= TDEC
0356                        33,2524  02530 0          2CADR GUIDANCE
C0356 REF   1               33,2525  66064 0
0357  REF  40 LAST 704      33,2526  0 5701 1         TC    FIXDELAY
0358                        33,2527  00454 1          DEC   300        WAIT 3 SECS BEFORE CALLING THRUST FILTER

0359                        33,2530  0 0006 1 GUIDANCE EXTEND           TUNE IN ASCENT GUIDANCE
0360  REF   1               33,2531  3 2660 0         DCA   ATMAG4
0361  REF   7 LAST 702      33,2532  53'073 0         DXCH  AVGEXIT

0362  REF   1               33,2533  3 2662 1         CAF   CDUJOBAD
0363  REF   2 LAST 700      33,2534  55'450 0         TS    ASCRET

03635 REF  50 LAST 704      33,2535  0 4161 0         TC    PHASCHNG
03637                       33,2536  00002 0          DCT   00002      DEACTIVATE GR 2

0364  REF  72 LAST 704      33,2537  1 5727 1         TCF   TASKOVER

0365                        33,2540  0 0004 0 MP4TERM1 INHINT
0366  REF   1               33,2541  3 2611 0         CAF   DOSCEK
0367  REF  98 LAST 704      33,2542  0 5663 1         TC    WAITLIST
0368  REF  73 LAST 705                    E4         EBANK= TDEC
0369                        33,2543  02554 1          2CADR TCO+5
C0369 REF   1               33,2544  66064 0
0370  REF  51 LAST 705      33,2545  0 4161 0         TC    PHASCHNG
0371                        33,2546  47012 1          DCT   47012
0372                        33,2547  00764 1          DEC   500
0373  REF  74 LAST 705                    E4         EBANK= TDEC
0374                        33,2550  02554 1          2CADR TCO+5
C0374 REF   2 LAST 705      33,2551  66064 0
0375  REF  40 LAST 683      33,2552  0 5225 1         TC    POSTJUMP
0376  REF   3 LAST 684      33,2553  60324 1          CADR  SERVEXIT

0377  REF  12 LAST 704      33,2554  0 5073 0 TCO+5   TC    2LMP+DT
0378                        33,2555  00227 0          DEC   151        ENGINE SELECT-DESC ARM-OFF
0379                        33,2556  00127 0          DEC   87         MANUAL THROTTLE-RESET (30 PERCENT)
0380                        33,2557  00144 0          DEC   100        DELAY ONE SECOND
```

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```
0381  REF  52 LAST 704    33,2560  0 5270 1            TC      IBNKCALL      SET MAXIMUM DEADBAND
0382  REF   6 LAST 699    33,2561    40054 1           CADR    SETMAXDB

0383  REF  52 LAST 705    33,2562  0 4161 0            TC      PHASCHNG
0384                      33,2563    47012 1           OCT     47012
0385                      33,2564    01604 1           DEC     900
0386  REF  75 LAST 705                 E4              EBANK=  TDEC
0387                      33,2565    02571 0           2CADR   TCO+15
C0387 REF   1             33,2566    66064 0
0388  REF  41 LAST 705    33,2567  0 5701 1            TC      FIXDELAY
0389                      33,2570    01604 1           DEC     900           DELAY NINE SECONDS

0390  REF  13 LAST 705    33,2571  0 5073 0  TCO+15    TC      2LMP+DT
0391                      33,2572    00365 1           DEC     245           DPS PQGS NO 1- OFF
0392                      33,2573    00325 0           DEC     213           DPS PQGS NO 2- OFF
0393                      33,2574    00144 0           DEC     100

0394  REF  14 LAST 706    33,2575  0 5073 0            TC      2LMP+DT
0395                      33,2576    00345 0           DEC     229           DPS PQGS ARM NO 1- DISABLE
0396                      33,2577    00305 1           DEC     197           DPS PQGS ARM NO 2- DISABLE
0397                      33,2600    02570 1           DEC     1400          DELAY 14 SECONDS

0398  REF  11 LAST 698    33,2601  0 6067 0            TC      FLAGDOWN      TERMINATE AVEG AND DO AUTO AVETOMID
0399                      33,2602    00041 1           OCT     00041         ALSO KNOCK DOWN THE POOH FLAG

0402  REF  53 LAST 706    33,2603  0 4161 0            TC      PHASCHNG      DEACTIVATE GROUP 2
0403                      33,2604    00002 0           OCT     00002

0404  REF  73 LAST 705    33,2605  1 5727 1            TCF     TASKOVER

R0405 ********************************************************************
R0406 TIME INCREMENTS FOR WAITLISTS IN MP4 = XXXXXCEK = DEC XXXXX0 CS
0408  ********************33,2606*****00310*0*****CEK*****DEC*****200*************                4
0409                      33,2607    00454 1  003CEK    DEC     300

0410                      33,2610    00620 0  004CEK    DEC     400

0411                      33,2611    00764 1  005CEK    DEC     500

0412                      33,2612    01274 1  007CEK    DEC     700

0413                      33,2613    04064 1  021CEK    DEC     2100

0414                      33,2614    05670 0  030CEK    DEC     3000

0415                      33,2615    00252 1  XTRANSON  OCT     00252         CHANNEL 5 CODE FOR 4-JET TRANSLATION
```

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R0418  CONSTANTS FOR PRECISION CALCULATIONS AND FOR INITIALIZATION OF ASCENT ROUTINE
 0418  ****************************************************************ANTICIPATED INITIAL ACCELERATION M/CS/CS
C0419                  33,2617   17610 0
 0420                  33,2620   07363 0          2DEC   0.2990 E+2 B-7  INITIAL EXHAUST VELOCITY  M/CS
C0420                  33,2621   06315 0
 0421                  33,2622   27501 0          2DEC   0.9678 E+5 B-17 ESTIMATED BURNUP TIME IN CENTISECONDS
C0421                  33,2623   20000 0
 0422                  33,2624   05202 1  BBLOCK  2DEC   0.1642           1/DV1
C0422                  33,2625   10056 0
 0423                  33,2626   05202 1          2DEC   0.1642           1/DV2
C0423                  33,2627   10056 0
 04235                 33,2630   05202 1          2DEC   0.1642           1/DV3
C04235                 33,2631   10056 0
 0424                  33,2632   17146 1  KREST   2DEC   0.4750           LIMITS MAXIMUM PITCH TO 72 DEGREES
C0424                  33,2633   14632 0
 0425                  33,2634   11773 1  KRTEST  2DEC   0.3132
C0425                  33,2635   02555 0
 0426                  33,2636   06065 1  TGOEST  2DEC   25000 B-17
C0426                  33,2637   00000 1
 0427                  33,2640   20000 0  BODYVECT 2DEC  .5
C0427                  33,2641   00000 1
 0428                  33,2642   00000 1  CBLOCK  2DEC   0                RDOTD
C0428                  33,2643   00000 1
 0429                  33,2644   00000 1          2DEC   0                YDOTD
C0429                  33,2645   00000 1
   4   ****************************************************************
```

```
R0432   GENADRS, ECADRS, AND 2CADRS USED IN MP4
R0433   ************************************************************

 0434   REF   2 LAST 682      33,2646   02251 0  AVGENADR GENADR AVERAGEG

 0436   REF  76 LAST 706                    E4             EBANK= TDEC
 0437                        33,2647   02540 1  MP4TM1AD 2CADR  MP4TERM1
C0437   REF   1              33,2650   66064 0
 0438   REF  77 LAST 707                    E4             EBANK= TDEC
 0439                        33,2651   02324 0  EXITADR  2CADR  SERVEXIT
C0439   REF   4 LAST 705     33,2652   60064 0
 0440   REF 125 LAST  44                    E4             EBANK= AMEMORY
 0441                        33,2653   02341 0  ORBINTAD 2CADR  MIDTOAVE
C0441   REF   2 LAST 684     33,2654   16064 1
 0442   REF  14 LAST 695                    E5             EBANK= ETHROT
 0443                        33,2655   03466 0  PCNTFMAD 2CADR  PCNTFMAX
C0443   REF   2 LAST 695     33,2656   60065 1
 0444   REF  78 LAST 707                    E4             EBANK= TDEC
 0445                        33,2657   03005 1  ATMAG4   2CADR  ATMAG
C0445   REF   1              33,2660   64064 1
 0448   REF   1              33,2661   66333 1  <ALC4AD  FCADR  PREKALC4
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```
 0449   REF   1            33,2662   60703 0  CDUJOBAD FCADR  FINDCDUD

R0450   ************************************************************
R0451   TASKSETR SUBROUTINE - SETS UP WAITLISTS REFERENCED TO VALUE OF TDEC
   45   ************************************************************
```

```
0453                                33,2663  0 0006 1  TASKSETR EXTEND
0454   REF   74 LAST 603           33,2664  22 061 0           DXCH   ITEMP1
0455   REF 143 LAST 698           33,2665  54 001 1           TS     L
0456   REF 225 LAST 698           33,2666  3 7767 0           CAF    ZERO
0457   REF 278 LAST 685           33,2667  52 145 0           DXCH   MPAC
0458   REF  26 LAST 635           33,2670  52 064 1           DXCH   ITEMP3
0459   REF 226 LAST 708           33,2671  3 7767 0           CAF    ZERO
0460   REF 279 LAST 708           33,2672  56 146 1           XCH    MPAC +2
0461   REF  23 LAST 580           33,2673  54 065 0           TS     ITEMP5
0462                               33,2674  0 0006 1           EXTEND
0463   REF  25 LAST 698           33,2675  4 0025 1           DCS    TIME2
0464   REF 280 LAST 708           33,2676  20 145 0           DAS    MPAC
0465   REF   3 LAST 692           33,2677  3 7751 0           CAF    EBANK4
0466   REF  47 LAST 692           33,2700  56 003 1           XCH    EBANK
0467   REF  41 LAST 630           33,2701  54 062 1           TS     ITEMP2
0468                               33,2702  0 0006 1           EXTEND
0469   REF  79 LAST 707           33,2703  3 1567 1           DCA    TDEC
0470   REF 281 LAST 708           33,2704  20 145 0           DAS    MPAC
0471   REF   7 LAST 361           33,2705  0 7327 0           TC     TPAGREE
0472   REF  24 LAST 708           33,2706  3 0065 1           CA     ITEMP5
0473   REF 282 LAST 708           33,2707  54 146 0           TS     MPAC +2
0474   REF  27 LAST 708           33,2710  52 064 1           DXCH   ITEMP3
0475   REF 283 LAST 708           33,2711  52 145 0           DXCH   MPAC
0476                               33,2712  0 0006 1           EXTEND
0477                               33,2713  1 2716 1           BZF    +3
0478   REF   5 LAST 309           33,2714  0 6000 1           TC     ABORT
0479                               33,2715   00404 1           DCT    00404
0480   REF 144 LAST 708           33,2716  56 001 0           XCH    L
0481                               33,2717  0 0006 1           EXTEND
0482                               33,2720  6 2714 1           BZMF   -4
0483   REF  42 LAST 708           33,2721  22 062 0           LXCH   ITEMP2
0484   REF  48 LAST 708           33,2722  22 003 1           XCH    EBANK
0485   REF  75 LAST 708           33,2723  0 0061 0           TC     ITEMP1
 486   ********************************************************************
```

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L       MISSION PHASE 6 COAST SIVB ATTACHED                          USER'S OWN PAGE NO.  1          S3

R000001 PROGRAM DESCRIPTION
R000002    COAST SIVB ATTACHED

R000003 MOD NO.  1      DATE = 4 NOV 66

R000004 MOD BY = OVERBAUGH
R000005 FUNCTIONAL DESCRIPTION
R000006    WHEN THE DV MONITOR DETECTS SIVB SHUTDOWN THE
R000007    THRUST MISSION CONTROL PROGRAM INITIATES MP6.
R000008    DURING THIS PHASE THE ABORT COMMAND MONITOR AND
R000009    THE TUMBLE MONITOR ARE TERMINATED AND THE C-BAND
R00001     XPONDER IS SET TO ON*.  WHEN THRUST DUE TO
R000011    VENTING BECOMES NEGLIGIBLE READING OF
R000012    THE PIPAS IS TERMINATED.

R000013 NORMAL EXIT MODES =
R000014    TC   TASKOVER

R000015 ERASABLE INITIALIZATION REQUIRED
R000016    MP6TO7

R000017 OUTPUT
R000018    UPDATE MODREG
R000019    TERMINATE ABORT COMMAND MONITOR
R00002     TERMINATE TUMBLE MONITOR
R000021    MISSION SCHEDULING REGISTERS SET TO CALL MP7

R000022 DEBRIS
R000023    CENTRALS,A,Q,Z

R000026 SUBROUTINES CALLED
R000027    EXECUTIVE(ENDOFJOB)
R000028    WAITLIST
R000029    LONGCALL
R00003     NEWMODEX
R000031    1LMP
R000032    FLAG1DWN
R000033    FLAG2DWN
R000034    SCHEDULE ENTRY ROUTINE(MPENTRY)

 0001                                  27,2504          BANK   27
 0002   REF   1                          E3             EBANK= MP6TO7

 0003   REF  17 LAST 696     27,2504  0 4117 1  MP6JOB  TC     NEWMODEX      UPDATE MODREG
 0004                        27,2505   00013 0          OCT    13

 00041  REF  17 LAST 612     27,2506  3 6306 1          CAF    SIX
 00042  REF   8 LAST 696     27,2507  54 764 0          TS     PHASENUM

 0005   REF  54 LAST 706     27,2510  0 4161 0          TC     PHASCHNG
```

L MISSION PHASE 6 COAST SIVB ATTACHED USER'S OWN PAGE NO. 2 53 E3

```
 0006                          27,2511  47012 1          OCT    47012
 0007                          27,2512  13560 0          DEC    6000
 00079  REF   2 LAST 709                    E3          EBANK=  MP6TO7
 0008                          27,2513  02526 1          2CADR  MP6A
C0008   REF   1               27,2514  56063 1
 00085  REF  41 LAST 633      27,2515  3 7756 1          CAF    BIT6
 00086  REF   5 LAST 696      27,2516  0 4105 1          TC     SETRSTRT      SET RESTART FLAG

 0009   REF   1               27,2517  3 2525 1          CAF    DEC6000       INITIALIZE 1 MIN DELAY
 0010                          27,2520  0 0004 0          INHINT
 0011   REF  39 LAST 705      27,2521  0 5663 1          TC     WAITLIST
 00119  REF   3 LAST 710                    E3          EBANK=  MP6TO7
 0012                          27,2522  02526 1          2CADR  MP6A
C0012   REF   2 LAST 710      27,2523  56063 1
 0014   REF  75 LAST 704      27,2524  1 5567 1          TCF    ENDOFJOB
 0015                          27,2525  13560 0  DEC6000  DEC    6000

 0024   REF   4 LAST 671      27,2526  0 6076 0  MP6A    TC     FLAG2DWN      TERMINATE ABORT COMMAND MONITOR
 0025                          27,2527  00400 0           OCT    00400         BIT 9

A0026                                                   TERMINATE TUMBLE MONITOR

 0027   REF  12 LAST 706      27,2530  0 6067 0          TC     FLAG1DWN
 0028                          27,2531  20000 0           OCT    20000         BIT14
 0036   REF  55 LAST 709      27,2532  0 4161 0  MP6B    TC     PHASCHNG
 0037                          27,2533  27042 1           OCT    27042
 0038   REF   1               27,2534  75232 0           -GENADR 656SEC
 00389  REF   4 LAST 710                    E3          EBANK=  MP6TO7
 0039                          27,2535  02547 0           2CADR  CBXPNDR
A0040   REF   1               27,2536  56063 1  CALL C-BAND TRANSPONDER-ON*

 0041                          27,2537  0 0006 1          EXTEND
 0042   REF   2 LAST 710      27,2540  3 2546 1          DCA    656SEC        LONGCALL 10 M 56 S
 0043   REF   3 LAST 680      27,2541  0 5741 0          TC     LONGCALL      FOR C-BAND TRANSPONDER-ON*
 00439  REF   5 LAST 710                    E3          EBANK=  MP6TO7
 0044                          27,2542  02547 0           2CADR  CBXPNDR
C0044   REF   2 LAST 710      27,2543  56063 1
 0045   REF  74 LAST 706      27,2544  1 5727 1          TCF    TASKOVER
 0046                          27,2545  00004 0  656SEC   2DEC   65600
A0051                          27,2546  00100 0  C-BAND TRANSPONDER-ON*

 0052   REF   6 LAST 703      27,2547  0 5060 1  CBXPNDR TC     1LMP
 0053                          27,2550  00152 1           DEC    106

 0054   REF  18 LAST 705      27,2551  0 4141 1          TC     2PHSCHNG
 0055                          27,2552  00002 0           OCT    00002
 0056                          27,2553  05013 0           OCT    05013
 0057                          27,2554  77777 0           OCT    77777

A0058                                                   CALL SCHEDULE ENTRY ROUTINE
```

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L       MISSION PHASE 6 COAST SIVB ATTACHED                          USER'S OWN PAGE NO.  3          S3  E3

 0059   REF   1              27,2555  0 5126 1        TC     MPENTRY
 0060                        27,2556    00001 0       DEC    1              J=1
 0061                        27,2557    00007 0       DEC    7              MP=7
 0062   REF   6 LAST 710     27,2560    01772 1       ADRES  MP6T07         DT = 28 MIN

A00621                                  TERMINATE READING OF PIPAS.
A00622                                  THRUST DUE TO VENTING AFTER SIVB
A00623                                  SHUTDOWN HAS BECOME NEGLIGIBLE.

 00624  REF  13 LAST 710     27,2561  0 6067 0        TC     FLAGDOWN       TERMINATE SERVICER
 00625                       27,2562    00001 0       OCT    1
 0063   REF  75 LAST 710     27,2563  1 5727 1        TCF    TASKOVER

R0064   END OF MISSION PHASE 6
```

L MP 7 - SIVB/LEM SEPARATION USER'S OWN PAGE NO. 1 53

```
0001                                25,2474          BANK  25
0002  REF  80 LAST 708               E4               EBANK= TDEC

R0003  PROGRAM DESCRIPTION- MISSION PHASE 7 - SIVB/LEM SEPARATION        DATE- 21 OCT 66
R0005  MOD NO- 0                                                        LOG SECTION- MP 7 - SIVB/LEM SEPARATION
R0007  MOD BY- GILBERT                                                  ASSEMBLY- SUNBURST REVISION 12

R0009  FUNCTIONAL DESCRIPTION
R0010          SIVB/LEM SEPARATION IS STARTED 39 MIN, 56 SEC, AFTER SIVB SHUTDOWN IS DETECTED, AT 00/11/04, ONE
R0012  MINUTE AFTER BOOST SHUTDOWN IS DETECTED, MISSION TIMER NO. 1 IS SET TO 38M 56S AND MISSION PHASE REGISTER NO. 1
R0014  TO MP 7. MISSION PHASE 7 STARTS AT 00/50/00. THIS PROGRAM COMMANDS A SEQUENCE OF EVENTS INCLUDING RCS COLD
R0016  FIRE PURGE, RCS PRESSURIZATION, S BAND SYSTEM ACTIVATION, +X TRANSLATION INITIATION OF LEM/SIVB SEPARATION
R0018  SEQUENCE, AND AGS ACTIVATION. IMMEDIATELY AFTER PHYSICAL SEPARATION, 00/54/00, THE PGNCS HOLDS THE ATTITUDE RATE
R0020  WHICH EXISTED AT SEPARATION TO MINIMIZE THE PROBABILITY OF RE-CONTACT. RCS +X TRANSLATION IS TERMINATED 15
R0022  SECONDS AFTER SEPARATION AT 00/54/15 AT WHICH TIME AUTOMATIC ATTITUDE HOLD IS INITIATED. THIS TERMINATION
R0024  FOLLOWS A SEQUENCE STARTING AT 00/53/55 DURING WHICH THE JETS ARE TURNED ON FOR 10 SECONDS, OFF FOR 5 SECONDS,
R0026  AND ON FOR 5 SECONDS. THIS IS DUE TO THE POSSIBILITY OF HEAT AFFECTING THE RENDEZVOUS RADAR ANTENNAE.
R0028  MISSION PHASE TIMER NO. 4 IS SET TO START MISSION PHASE 8 (DPS COLD SOAK) IN 08 SECONDS. MISSION PHASE TIMER
R0030  NO. 2 IS SET TO START MISSION PHASE 9 (DPS 1) IN 3H 1M 47S. MAJOR MODE 14 IS DISPLAYED DURING THIS PHASE.

R0032  CALLING SEQUENCE
R0033      SIVB/LEM SEPARATION IS CALLED BY THE MISSION SCHEDULING ROUTINE AS A JOB. THE MISSION SCHEDULING ENTRY
R0035  ROUTINE WAS CALLED 1 MINUTE AFTER BOOST SHUTDOWN IN MISSION PHASE 6 TO SET TIMER NO. 1 TO 38 MINUTES 56 SECONDS.

R0037  SUBROUTINES CALLED
R0038      NEWMODEX, WAITLIST, FIXDELAY, 1LMP+DT, 2LMP+DT, FLAG1UP, FLAG1DWN, MPENTRY, MIDTOAVE, AVETOMID, TPAGREE,
R0040  PREREAD, READACCS, SERVICER, AVERAGEG.

R0041  NORMAL EXIT MODE
R0042      TASKOVER (ENDOFJOB INITIALLY SINCE TASK IS REQUESTED)

R0043  ALARM OR ABORT EXIT MODES
R0044      NONE

R0045  INPUT
R0046      MISSION SCHEDULING MAINTENANCE ROUTINE MUST BE INHIBITED AT BEGINNING AND ENABLED AT END OF MISSION PHASE 7.

R0048  OUTPUT
R0049      RCS COLD FIRE PURGE, RCS PRESSURIZATION, S BAND SYSTEM ACTIVATION, +X TRANSLATION, INITIATION OF LEM/SIVB
R0051  SEPARATION SEQUENCE, AND SCHEDULING OF MISSION PHASES 8 AND 9 (DPS COLD SOAK AND DPS 1).

R0053  ERASABLE INITIALIZATION REQUIRED
R0054      NORMAL MISSION SEQUENCE SETS ERASABLES PROPERLY

R0055  DEBRIS
R0056      CENTRALS = A,L,Q
R0057      OTHER    = ERASABLES IN SUBROUTINES USED
```

L MP 7 - SIVB/LEM SEPARATION USER'S OWN PAGE NO. 2 S3 E4

```
0058  REF  19 LAST 710    25,2474  0 4141 1  MP07J03  TC      2PHSCHNG
0059                      25,2475   00006 1            OCT     00006
0060                      25,2476   05022 1            OCT     05022
0061                      25,2477   20000 0            OCT     20000

0062  REF  20 LAST 713    25,2500  0 4141 1            TC      2PHSCHNG
0063                      25,2501   00003 1            OCT     00003
0064                      25,2502   00004 0            OCT     00004

0065  REF  37 LAST 627    25,2503  3 7755 1            CAF     BIT7
0066  REF   6 LAST 710    25,2504  0 4105 1            TC      SETRSTRT      SET RESTART FLAG

0067  REF  56 LAST 710    25,2505  0 4161 0            TC      PHASCHNG
0068                      25,2506   47013 0            OCT     47013
0069                      25,2507   07640 1            DEC     4000
0070  REF  81 LAST 712                    E4           EBANK=  TDEC
0071                      25,2510   02555 0            2CADR   SIVBSEP
C0071 REF   1             25,2511   52064 1
0072  REF  57 LAST 713    25,2512  0 4161 0            TC      PHASCHNG
0073                      25,2513   06022 1            OCT     06022
0074  REF  82 LAST 713                    E4           EBANK=  TDEC
0075                      25,2514   02524 0            2CADR   DOOI
C0075 REF   1             25,2515   52064 1
0076                      25,2516  0 0004 0            INHINT
0077  REF   1             25,2517  3 3005 1            CA      40SEC
0078  REF  90 LAST 710    25,2520  0 5663 1            TC      WAITLIST
0079  REF  83 LAST 713                    E4           EBANK=  TDEC
0080                      25,2521   02555 0            2CADR   SIVBSEP
C0080 REF   2 LAST 713    25,2522   52064 1
0081                      25,2523  0 0003 1            RELINT

0082                      25,2524  0 0006 1  DOOI      EXTEND
0083  REF  26 LAST 708    25,2525  3 0025 0            DCA     TIME2         SET UP TIME FOR MIDTOAVE
0084  REF  84 LAST 713    25,2526  53,567 0            DXCH    TDEC
0085                      25,2527  0 0006 1            EXTEND
0086  REF   1             25,2530  3 3007 0            DCA     MP07DELT
0087  REF  85 LAST 713    25,2531  21,567 0            DAS     TDEC

0088                      25,2532  0 0006 1            EXTEND
0089  REF  86 LAST 713    25,2533  3 1567 1            DCA     TDEC
0090  REF   5 LAST 198    25,2534  52 421 1            DXCH    TIMEHOLD      NO RADAR ON 206

0091  REF  18 LAST 709    25,2535  0 4117 1            TC      NEWMODEX      DISPLAY MAJOR MODE 14
0092                      25,2536   00014 1            OCT     14

0093                      25,2537  0 0006 1            EXTEND
0094  REF   1             25,2540  3 3011 1            DCA     MIDAVE2C      PRIOR TO THRUST
0095  REF  21 LAST 700    25,2541  52 006 0            DXCH    Z

0096  REF  58 LAST 713    25,2542  0 4161 0            TC      PHASCHNG
```

L MP 7 - SIVB/LEM SEPARATION USER'S OWN PAGE NO. 3 S3 E4

```
0097                        25,2543  04022 0          DCT     04022
0098  REF   1               25,2544  3 3015 0         CAF     AVRAGEG7        SERVICER CALLS AVERAGEG
0099  REF  12 LAST 702      25,2545  55'310 0         TS      OVSELECT

0100                        25,2546  0 0006 1         EXTEND
0101  REF   1               25,2547  3 3013 0         DCA     SVREXIT         NORMAL EXIT FROM AVERAGEG
0102  REF   8 LAST 705      25,2550  53'073 0         DXCH    AVGEXIT

0103  REF   2 LAST 688      25,2551  3 3014 1         CAF     JETS+X          RCS COLD FIRE PURGE
0104                        25,2552  0 0006 1         EXTEND
0105                        25,2553  01 005 0         WRITE   5

0106  REF  76 LAST 710      25,2554  0 5567 0         TC      ENDOFJOB        AND RELINT

0107  REF  21 LAST 713      25,2555  0 4141 1 SIVBSEP TC      2PHSCHNG
0108                        25,2556  00003 1          DCT     00003
0109                        25,2557  05012 1          DCT     05012
0110                        25,2560  77777 0          DCT     77777

0111  REF 227 LAST 708      25,2561  3 7767 0         CAF     ZERO            TERMINATE RCS COLD FIRE PURGE
0112                        25,2562  0 0006 1         EXTEND
0113                        25,2563  01 005 0         WRITE   5

0114  REF  59 LAST 713      25,2564  0 4161 0         TC      PHASCHNG
0115                        25,2565  47012 1          DCT     47012
0116                        25,2566  00620 0          DEC     400
0117  REF  87 LAST 713            E4                 EBANK=  TDEC
0118                        25,2567  02573 1          2CADR   SIVB1
C0118 REF   1               25,2570  52064 1
0119  REF  42 LAST 706      25,2571  0 5701 1         TC      FIXDELAY        WAIT 4 SECONDS
0120                        25,2572  00620 0          DEC     400

0121  REF  15 LAST 706      25,2573  0 5073 0 SIVB1   TC      2LMP+DT
0122                        25,2574  00274 0          DEC     188             RCS MAIN S/O VALVES, SYS. A - OPEN **
0123                        25,2575  00276 1          DEC     190             RCS MAIN S/O VALVES, SYS. B - OPEN **
0124                        25,2576  00144 0          DEC     100             WAIT 1 SECOND

0125  REF  26 LAST 704      25,2577  0 5101 1         TC      1LMP+DT
0126                        25,2600  00004 0          DEC     4               ED BATTERY ACTIVATION - ON
0127                        25,2601  00144 0          DEC     100             WAIT 1 SECOND

0128  REF  16 LAST 714      25,2602  0 5073 0         TC      2LMP+DT
0129                        25,2603  00275 1          DEC     189             RESET **
0130                        25,2604  00277 0          DEC     191             RESET **
0131                        25,2605  01604 1          DEC     900             WAIT 9 SECONDS

0132  REF  27 LAST 714      25,2606  0 5101 1         TC      1LMP+DT
0133                        25,2607  00006 1          DEC     6               RCS PRESSURIZE - FIRE **
0134                        25,2610  00310 0          DEC     200             WAIT 2 SECONDS
```

L MP 7 - SIVB/LEM SEPARATION USER'S OWN PAGE NO. 4 S3 E4

```
0135  REF  28 LAST 714   25,2611  0 5101 1          TC     1LMP+DT
0136                     25,2612    00007 0         DEC    7              RESET **
0137                     25,2613    05360 1         DEC    2800           WAIT 28 SECONDS

0138  REF  29 LAST 715   25,2614  0 5101 1          TC     1LMP+DT
0139                     25,2615    00005 1         DEC    5              ED BATTERY ACTIVATION - SAFE *
0140                     25,2616    22434 1         DEC    9500           WAIT 95 SECONDS                    ...

0141                     25,2617  0 0006 1          EXTEND
0142  REF   6 LAST 713   25,2620  3 0421 0          DCA    TIMEHOLD
0143  REF   3 LAST  40   25,2621  53,664 0          DXCH   DT2TEMPD
0144                     25,2622  0 0006 1          EXTEND
0145  REF  27 LAST 713   25,2623  4 0025 1          DCS    TIME2          TIG = 28 SEC. = TDEC + 2 SEC.
0146  REF   4 LAST 715   25,2624  21,664 0          DAS    DT2TEMPD

0147  REF  50 LAST 714   25,2625  0 4161 0          TC     PHASCHNG
0148                     25,2626    05012 1         DCT    05012
0149                     25,2627    77777 0         DCT    77777

0150                     25,2630  0 0006 1          EXTEND
0151  REF   5 LAST 715   25,2631  3 1664 1          DCA    DT2TEMPD
0152  REF   7 LAST 715   25,2632  52 421 1          DXCH   TIMEHOLD
0153  REF   8 LAST 715   25,2633  10 421 1          CCS    TIMEHOLD +1    INSURE WAITLIST TIME POSITIVE
0154  REF 150 LAST 691   25,2634  6 7763 1          AD     ONE
0155                     25,2635  1 2640 0          TCF    +3
0156                     25,2636  4 0000 0          COM
0157  REF  40 LAST 705   25,2637  6 7743 0          AD     POSMAX
0158  REF   3 LAST  40   25,2640  55,662 0          TS     DT2TEMP
0159  REF  31 LAST 713   25,2641  0 5663 1          TC     WAITLIST       REQUEST LASTBIAS AT TIG - 30 SECONDS
0160  REF  38 LAST 714                E4           EBANK= TDEC
0161                     25,2642    03016 0         2CADR  TIG-30
C0161 REF   1            25,2643    52064 1
0162  REF  22 LAST 714   25,2644  0 4141 1          TC     2PHSCHNG
0163                     25,2645    40052 1         DCT    40053
0164                     25,2646    47014 1         DCT    47014
0165  REF   4 LAST 715   25,2647    76115 0         =GENADR DT2TEMP
0166  REF  89 LAST 715                E4           EBANK= TDEC
0167                     25,2650    03016 0         2CADR  TIG-30
C0167 REF   2 LAST 715   25,2651    52064 1
0168  REF  43 LAST 714   25,2652  0 5701 1          TC     FIXDELAY       WAIT 55 SECONDS
0169                     25,2653    12574 1         DEC    5500

0170  REF  53 LAST 706   25,2654  0 5270 1 SIVB2    TC     IBNKCALL       DEADBAND SELECT - MAX
0171  REF   7 LAST 706   25,2655    40054 1         CADR   SETMAXDB

0172  REF   3 LAST 714   25,2656  3 3014 1          CAF    JETS+X         COMMAND +X TRANSLATION - ON (4 JET)
0173                     25,2657  0 0006 1          EXTEND
0174                     25,2660  01 005 0          WRITE  5
0175  REF  54 LAST 715   25,2661  0 5270 1          TC     IBNKCALL
0176  REF   5 LAST 704   25,2662    40062 1         CADR   JLLAGE
```

L MP 7 - SIVB/LEM SEPARATION USER'S OWN PAGE NO. 5 S3 E4

```
 0177   REF  51 LAST 715     25,2663   0 4161 0            TC     PHASCHNG
 0178                        25,2664   47012 1             OCT    47012
 0179                        25,2665   00144 0             DEC    100
 0180   REF  30 LAST 715                 E4                EBANK= TDEC
 0181                        25,2666   02672 0             2CADR  SIVB3
C0181   REF   1             25,2667   52064 1
 0182   REF  44 LAST 715     25,2670   0 5701 1            TC     FIXDELAY      WAIT 1 SECOND
 0183                        25,2671   00144 0             DEC    100

 0184   REF  30 LAST 715     25,2672   0 5101 1  SIVB3     TC     1LMP+DT
 0185                        25,2673   00212 0             DEC    138           XMTR/RCVR (S-BAND) - PRIM *
 0186                        25,2674   00454 1             DEC    300           WAIT 3 SECONDS

 0187   REF  31 LAST 716     25,2675   0 5101 1            TC     1LMP+DT
 0188                        25,2676   00072 1             DEC    58            LEM/SIVB SEPARATE ARM - ON *
 0189                        25,2677   00062 0             DEC    50            WAIT 500 MILLISECONDS

 0190   REF  57 LAST 699     25,2700   4 0077 0            CS     DAPBOOLS      ENABLE DAP
 0191   REF   8 LAST 699     25,2701   7 7751 1            MASK   3DDAPGO
 0192   REF  58 LAST 716     25,2702   26 077 0            ADS    DAPBOOLS

 01925  REF  52 LAST 716     25,2703   0 4161 0            TC     PHASCHNG
 01926                       25,2704   47012 1             OCT    47012
 01927                       25,2705   00062 0             DEC    50
 01928  REF  91 LAST 716                 E4                EBANK= TDEC
 01929                       25,2706   02712 1             2CADR  SIVB3A
C01929  REF   1             25,2707   52064 1
 0193   REF  45 LAST 716     25,2710   0 5701 1            TC     FIXDELAY      WAIT 500 MILLISECONDS
 0194                        25,2711   00062 0             DEC    50

 0195   REF  55 LAST 715     25,2712   0 5270 1  SIVB3A    TC     IBNKCALL
 0196   REF   2 LAST 689     25,2713   40072 0             CADR   SETRATE       HOLD VEHICLE ATTITUDE RATE

 0197   REF  32 LAST 716     25,2714   0 5101 1            TC     1LMP+DT
 0198                        25,2715   00132 1             DEC    90            LEM/SIVB SEPARATE - COMMAND **
 0199                        25,2716   00012 1             DEC    10            WAIT 100 MILLISECONDS

 0200   REF  56 LAST 716     25,2717   0 5270 1            TC     IBNKCALL      DEADBAND SELECT - MIN
 0201   REF   5 LAST 699     25,2720   40046 1             CADR   SETMINDB

 0202   REF  24 LAST 698     25,2721   4 0075 1            CS     FLAGWRD1      SETS SIVBGONE TO 1
 0203   REF  41 LAST 698     25,2722   7 7760 0            MASK   BIT4
 0204   REF  25 LAST 716     25,2723   26 075 1            ADS    FLAGWRD1

 02045  REF  53 LAST 716     25,2724   0 4161 0            TC     PHASCHNG
 02046                       25,2725   47012 1             OCT    47012
 02047                       25,2726   00132 1             DEC    90
 02048  REF  92 LAST 716                 E4                EBANK= TDEC
 02049                       25,2727   02733 1             2CADR  SIVB3B
C02049  REF   1             25,2730   52064 1
```

L MP 7 - SIVB/LEM SEPARATION USER'S OWN PAGE NO. 6 53 E4

```
0205  REF  46 LAST 716   25,2731  0 5701 1          TC      FIXDELAY        WAIT 900 MILLISECONDS
0206                     25,2732    00132 1         DEC     90

0207  REF  33 LAST 716   25,2733  0 5101 1  SIVB3B  TC      1LMP+DT
0208                     25,2734    00073 0         DEC     59              LEM/SIVB SEPARATE ARM - OFF *
0209                     25,2735    00144 0         DEC     100             WAIT 1 SECOND

0210  REF  34 LAST 717   25,2736  0 5101 1          TC      1LMP+DT
0211                     25,2737    00133 0         DEC     91              RESET **
0212                     25,2740    00454 1         DEC     300             WAIT 3 SECONDS

0213  REF  57 LAST 716   25,2741  0 5270 1          TC      IBNKCALL        COMMAND +X TRANSLATION - OFF (4 JET)
0214  REF   6 LAST 704   25,2742    40066 0         CADR    NOJLIAGE

0215  REF  54 LAST 716   25,2743  0 4161 0          TC      PHASCHNG
0216                     25,2744    47012 1         OCT     47012
0217                     25,2745    00764 1         DEC     500
0218  REF  93 LAST 716                 E4          EBANK=  TDEC
0219                     25,2746    02752 0         2CADR   SIVB4
C0219 REF   1            25,2747    52064 1
0220  REF  47 LAST 717   25,2750  0 5701 1          TC      FIXDELAY        WAIT 5 SECONDS
0221                     25,2751    00764 1         DEC     500

0222  REF  58 LAST 717   25,2752  0 5270 1  SIVB4   TC      IBNKCALL        COMMAND +X TRANSLATION - ON (4 JET)
0223  REF   6 LAST 715   25,2753    40062 1         CADR    JLLAGE

0224  REF  55 LAST 717   25,2754  0 4161 0          TC      PHASCHNG
0225                     25,2755    47012 1         OCT     47012
0226                     25,2756    00764 1         DEC     500
0227  REF  94 LAST 717                 E4          EBANK=  TDEC
0228                     25,2757    02763 1         2CADR   SIVB5
C0228 REF   1            25,2760    52064 1
0229  REF  48 LAST 717   25,2761  0 5701 1          TC      FIXDELAY        WAIT 5 SECONDS
0230                     25,2762    00764 1         DEC     500

0231  REF  59 LAST 717   25,2763  0 5270 1  SIVB5   TC      IBNKCALL        COMMAND +X TRANSLATION - OFF (4 JET)
0232  REF   7 LAST 717   25,2764    40066 0         CADR    NOJLIAGE

0233  REF  14 LAST 711   25,2765  0 6067 0          TC      FLAG1DWN        KNOCK DOWN AVERAGEG FLAG
0234                     25,2766    00001 0         OCT     00001

0235  REF  50 LAST 717   25,2767  0 5270 1          TC      IBNKCALL        HOLD LEM ATTITUDE
0236  REF   7 LAST 702   25,2770    40114 1         CADR    STOPRATE

0237  REF  51 LAST 717   25,2771  0 5270 1          TC      IBNKCALL        DEADBAND SELECT - MAX
0238  REF   8 LAST 715   25,2772    40054 1         CADR    SETMAXDB

0239  REF  23 LAST 715   25,2773  0 4141 1          TC      2PHSCHNG
0240                     25,2774    00002 0         OCT     00002
0241                     25,2775    05013 0         OCT     05013
```

L MP 7 - SIVB/LEM SEPARATION USER'S OWN PAGE NO. 7 S3 E4

```
0242                        25,2776   77777 0        OCT    77777

0243   REF   2 LAST 711     25,2777   0 5126 1       TC     MPENTRY     SCHEDULE DPS COLD SOAK
0244                        25,3000   00004 0        DEC    4           TIMER NO. 4
0245                        25,3001   00010 0        DEC    8           MISSION PHASE 8
0246   REF   1               25,3002   01751 0        ADRES  MPDT08

0247   REF   76 LAST 711    25,3003   1 5727 1       TCF    TASKOVER
```

L MP 7 - SIVB/LEM SEPARATION USER'S OWN PAGE NO. 8 S3 E4

```
 0248                          25,3004   00310 0  2SEC     DEC     200
 0249                          25,3005   07640 1  4DSEC    DEC     4000
 0250                          25,3006   00001 0  MP07DELT 2DEC    20500
C0250                          25,3007   10024 0
 0251  REF  35 LAST 717                      E4            EBANK=  TDEC
 0252                          25,3010   02341 0  MIDAVE2C 2CADR   MIDTOAVE
C0252  REF   3 LAST 707        25,3011   16064 1
 0253  REF  36 LAST 719                      E4            EBANK=  TDEC
 0254                          25,3012   02324 0  SVREXIT  2CADR   SERVEXIT
C0254  REF   5 LAST 707        25,3013   60064 0
 0255                          25,3014   00252 1  JETS+X   DCT     00252
 0256  REF   3 LAST 707        25,3015   02251 0  AVRAGES7 GENADR  AVERAGEG


 0257  REF  24 LAST 717        25,3016   0 4141 1 TIG-30   TC      2PHSCHNG
02575                          25,3017   00004 0           DCT     00004
02576                          25,3020   00335 1           DCT     00335     5,33 SPOT FOR PREREAD

02577  REF  53 LAST 697        25,3021   3 7763 1          CAF     BIT1
 0258  REF  92 LAST 715        25,3022   0 5663 1          TC      WAITLIST
 0259  REF   4 LAST 703                      E5            EBANK=  DVTOTAL
 0260                          25,3023   02000 0           2CADR   PREREAD
C0260  REF   6 LAST 703        25,3024   60065 1
 0265  REF  77 LAST 718        25,3025   1 5727 1          TCF     TASKOVER
```

L MISSION PHASE 8 - DPS COLD SOAK USER'S OWN PAGE NO. 1 S3

```
 00001                              27,2564          BANK   27
 0001   REF   4 LAST 702              E3             EBANK= RATEINDX
R000111 PROGRAM DESCRIPTION-          DATE- 07 DEC 66

R000112 MOD NO- 4                     LOG SECTION-
R000113 MOD BY- ELIASSEN              MISSION PHASE 8 - DPS COLD SOAK
R000115 FUNCTIONAL DESCRIPTION-

R000116 0/54/23  START MISSION PHASE 8 WHEN MISSION TIMER 4 COUNTS TO ZERO.

R000117          CHANGE MAJOR MODE TO 15.

R000118          DO DFI T/M CALIBRATION  (14 SECONDS).

R000119          WAIT 1 SECOND

R00012  0/54/38  LMP COMMANDS-
R000121                LANDING RADAR POWER ON*
R000122                RADAR SELF TEST ON*

R000123          CALL TO CALCULATE REQUIRED ATTITUDE
R000124                FOR DPS COLD SOAK -
R000125                LM X-AXIS NORMAL TO THE ECLIPTIC PLANE
R000126                AND BISECTOR OF LM +Z/-Y AXES TOWARD THE SUN.

R000127                CHANGE THE ATTITUDE OF THE
R000128                SPACECRAFT TO THAT REQUIRED FOR DPS COLD SOAK
R00013                 USING KALCMANU ROUTINE - MANEUVER RATE= 5 DEG/SEC.

R000131          WAIT 60 SECONDS

R000132          LMP COMMAND-
R000133                RADAR SELF TEST OFF*

R000134          WAIT 60 SECONDS

R000135 0/56/38  LMP COMMAND-
R000136                LANDING RADAR POWER OFF*

R00014           WAIT 15 SECONDS

R000141 0/56/53  VERIFY THAT MANEUVER IS COMPLETE.
R000142                (IF NOT GO TO CURTAINS)

R000143          SET MAXIMUM DEADBAND FOR LM-DAP.

R000144          CALL SCHEDULE ENTRY ROUTINE FOR DPS 1 WITH
R000145                J=2
R000146                MP=9
R000147                DT= 24 59M 14S
```

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L       MISSION PHASE 8 - DPS COLD SOAK                                 USER'S OWN PAGE NO.  2          S3

R0002   SUBROUTINES CALLED-
R000201         FINDVAC, ENDOFJOB
R000202         WAITLIST, TASKOVER
R000203         NEWMODEX, MMENTRY, PHASCHNG, 2PHSCHNG
R000204         INTPRET, BANKCALL, IBNKCALL, ATTSTALL, CURTAINS, POOH
R000205         FLAG1DWN, FLAG2DWN, SETMINDB, SETMAXDB
R000206         KALCMAN3, DCMTOCDU, VISTOGS
R000207         1LMP, 1LMP+DT, 2LMP+DT

R00023  NORMAL EXIT MODES-
R000231         TC     ENDOFJOB/TASKOVER
R000232 ALARM OR ABORT EXIT MODES-   NONE
R000233 OUTPUT- (INTERFACE, DISPLAYS, MEANINGFUL INFORMATION LEFT IN ERASABLE)
R000234         SAME AS FOR KALCMANU
R000236 ERASABLE INITIALIZATION REQUIRED-
R000237         TEPHEM   IN CENTISECONDS TRIPLE PRECISION
R000238         MP8TO9   DT FOR CALLING MP9- IN SECONDS(SEE ABOVE)

R000239 DEBRIS- (ERASABLE LOCATIONS DESTROYED BY THIS PROGRAM)
R00029          SAME AS FOR KALCMANU
 0008   REF   6 LAST 453                    7746   PRIOKM   EQUALS PRIO30      PRIORITY FOR KALCMANU PHASE 8 + 16
 0009   REF  19 LAST 713     27,2564  0 4117 1   MP8JOB   TC     NEWMODEX     UPDATE PROGRAM NUMBER
 0010                        27,2565   00015 0             OCT    15           ON DSKY

 001015 REF  56 LAST 717     27,2566  0 4161 0             TC     PHASCHNG
 001016                      27,2567   05022 1             OCT    05022
 001017                      27,2570   20000 0             OCT    20000
 00102  REF  23 LAST 578     27,2571  3 7754 0             CAF    BIT8
 00103  REF   7 LAST 713     27,2572  0 4105 1             TC     SETRSTRT     SET RESTART FLAG

 0011   REF 151 LAST 715     27,2573  3 7763 1             CAF    ONE          ESTABLISH TASK TO
 0012                        27,2574  0 0004 0             INHINT              PERFORM DFI T/M CAL.
 0013   REF  93 LAST 719     27,2575  0 5663 1             TC     WAITLIST
 00135  REF   5 LAST 720                  E3               EBANK= RATEINDX
 0014                        27,2576   02601 1             2CADR  MP8TASK
C0014   REF   1              27,2577   56063 1
 0016   REF  77 LAST 714     27,2600  0 5567 0             TC     ENDOFJOB

 0017   REF  35 LAST 717     27,2601  0 5101 1   MP8TASK  TC     1LMP+DT      LMP COMMAND
 00171                       27,2602   00354 0             DEC    236          DFI T/M CALIBRATE ON*
 00172                       27,2603   02260 1             DEC    1200         12 SECONDS DELAY

 00173  REF  17 LAST 714     27,2604  0 5073 0             TC     2LMP+DT      LMP COMMANDS
 00174                       27,2605   00355 1             DEC    237          DFI T/M CALIBRATE OFF*
 00175                       27,2606   00306 1             DEC    198          MASTER C+W ALARM RESET**  COMMAND
 00176                       27,2607   00310 0             DEC    200          2 SECONDS DELAY

 00177  REF  36 LAST 721     27,2610  0 5101 1             TC     1LMP+DT      LMP COMMAND
 0018                        27,2611   00307 0             DEC    199          MASTER C+W ALARM RESET- COMMAND RESET
 0019                        27,2612   00144 0             DEC    100          1 SECOND
```

L MISSION PHASE 8 - DPS COLD SOAK USER'S OWN PAGE NO. 3 S3 E3

```
 0025   REF   1              27,2613  3 7747 1  M8RADON  CAF     PRIO10      SET UP JOB TO CALCULATE
 0026   REF  18 LAST 703     27,2614  0 5516 0           TC      FINDVAC     REQ CDU ANGLES
00265   REF   6 LAST 721                   E3            EBANK=  RATEINDX
 0027                        27,2615    02670 1          2CADR   COLDSOAK
C0027   REF   2 LAST  67     27,2616    56063 1
 0028   REF  25 LAST 719     27,2617  0 4141 1           TC      2PHSCHNG
 0029                        27,2620    00054 0          OCT     00054
 0030                        27,2621    05012 1          OCT     05012
 0031                        27,2622    77777 0          OCT     77777

 0032   REF  18 LAST 721     27,2623  0 5073 0           TC      2LMP+DT     LMP COMMANDS
 0033                        27,2624    00266 0          DEC     182         LANDING RADAR POWER ON*
 0034                        27,2625    00032 0          DEC     26          RADAR SELF TEST ON*
 0035                        27,2626    13560 0          DEC     6000        WAIT 1 MIN

 0036   REF  37 LAST 721     27,2627  0 5101 1           TC      1LMP+DT     LMP COMMAND
 0037                        27,2630    00033 1          DEC     27          RADAR SELF TEST OFF*
 0038                        27,2631    13560 0          DEC     6000        WAIT 1 MIN

 0039   REF  38 LAST 722     27,2632  0 5101 1           TC      1LMP+DT
00391                        27,2633    00267 1          DEC     183         LANDING RADAR POWER OFF*
00392                        27,2634    02734 0          DEC     1500        15 SECONDS

00393   REF   2 LAST 375     27,2635  3 5656 1           CAF     PRIO35      SET UP JOB TO
00394   REF  22 LAST 704     27,2636  0 5505 1           TC      NOVAC       END MISSION PHASE
 0040   REF  31 LAST 695                   E3            EBANK=  LST1
 0041                        27,2637    02642 0          2CADR   MP9CALL
C0041   REF   1              27,2640    56063 1
 0042   REF  78 LAST 719     27,2641  0 5727 0           TC      TASKOVER
 0045   REF  14 LAST 683     27,2642  3 0076 0  MP9CALL  CA      FLAGWRD2    CHECK IF MANEUVER
 0046   REF  33 LAST 599     27,2643  7 7751 1           MASK    BIT11       WAS COMPLETED
 0047                        27,2644  0 0006 1          EXTEND
 0048                        27,2645  1 2647 1          BZF     +2
 0049   REF   2 LAST 704     27,2646  0 4743 0           TC      CURTAINS    MANEUVER NOT COMPLETED
 0050   REF 123 LAST 704     27,2647  0 5206 0           TC      BANKCALL
 0051   REF   2 LAST 704     27,2650    26743 0          CADR    ATTSTALL
 00511  REF   3 LAST 722     27,2651  0 4743 0           TC      CURTAINS    SICK RETURN

A0052                                  SET LM-DAP DEADBAND TO MAX=

 00521  REF  67 LAST 721     27,2652  0 4161 0           TC      PHASCHNG
 00522                       27,2653    00002 0          OCT     00002       DEACTIVATE GR 2

 00523  REF  26 LAST 722     27,2654  0 4141 1           TC      2PHSCHNG
 00525                       27,2655    00004 0          OCT     00004
 00527                       27,2656    05023 0          OCT     05023
 00529                       27,2657    30000 1          OCT     30000

 005291                      27,2660  0 0004 0           INHINT
 0053   REF 124 LAST 722     27,2661  0 5206 0           TC      BANKCALL
```

L MISSION PHASE 8 - DPS COLD SOAK USER'S OWN PAGE NO. 4 S3 E3

```
 0054   REF   9 LAST 717     27,2662   40054 1          CADR   SETMAXDB

A0055                                  CALL MISSION PHASE 9

 0056   REF   3 LAST 718     27,2663   0 5126 1         TC     MPENTRY     MANEUVER SUCCESSFUL
 0057                        27,2664    00002 0         DEC    2           J=2
 0058                        27,2665    00011 1         DEC    9           MP=9
 0059   REF   1             27,2666    01773 0         ADRES  MP8TO9       DT = 2H 59M 14S

 0060   REF   1             27,2667   0 4272 1         TC     POOH        END OF MISSION PHASE 8
```

L MISSION PHASE 8 - DPS COLD SOAK USER'S OWN PAGE NO. 5 S3 E3

```
P0068           CALCULATE CDU ANGLES FOR REQUIRED
R0069           COLDSOAK ATTITUDE - LEM X-AXIS NORMAL TO THE
R0070           ECLIPTIC AND BISECTOR OF -Y/+Z AXES TOWARD THE SUN.
 0072                        27,2670  0 0006 1  COLDSOAK  EXTEND
 0073   REF  28 LAST 715     27,2671  3 0025 0            DCA     TIME2
 0074   REF 234 LAST 708     27,2672  52 145 0            DXCH    MPAC
 007401                      27,2673  0 0006 1            EXTEND
 007402 REF   2 LAST 680     27,2674  3 1741 1            DCA     TLIFTOFF
 007403 REF 285 LAST 724     27,2675  20 145 0            DAS     MPAC            ADD TIME CLOCK ZEROED TO TIME2

 00741  REF 228 LAST 714     27,2676  3 7767 0            CA      ZERO
 00742  REF   2 LAST 389     27,2677  54 153 1            TS      MODE
 0075   REF  51 LAST 700     27,2700  0 6112 0            TC      INTPRET
R00751  CALCULATE TRANSFORMATION MATRIX FROM RCS COLD SOAK ATTITUDE
R00752  TO STABLE MEMBER COORDINATES.   CONVERT TO CDU ANGLES.
 0076                        27,2701  54201 0             SETPD   SR
 0077                        27,2702  00001 0                     0
 0078                        27,2703  20617 0                     14D
 0079                        27,2704  56371 1             TAD     DDV
 0080   REF   2 LAST 678     27,2705  01754 0                     TEPHEM          TIME IN CENTISEC SINCE PRECEDING JUNE 30
 0081   REF   1              27,2706  17113 1                     CSPERDAY        CENTISEC PER DAY
 0082                        27,2707  77606 1             PUSH                    T/2**9 = (DAYS SINCE JUNE 30TH)/2**9

A0083                                                   COMPUTE  SIN(2*PI*T/365.25), COS(2*PI*T/365.25)  WHERE
A0084                                                   T= NUMBER OF DAYS SINCE MIDNIGHT OF PRECEDING JUNE 30TH.

 0085                        27,2710  51025 1  ALTA      DSU     BPL             DIMINISH T/2**9 BY 365.25/2**9
 0086   REF   1              27,2711  17111 0                     ONEYR           UNTIL A NEGATIVE RESULT OCCURS.
 0087   REF   1              27,2712  56710 1                     ALTA
 0088                        27,2713  56215 1             DAD     DDV             ADD BACK 365.25/2**9 ONCE.
 0089   REF   2 LAST 724     27,2714  17111 0                     ONEYR           LET Y=RESULT
 0090   REF   3 LAST 724     27,2715  17111 0                     ONEYR           Y/365.25 IS LESS THAN ONE AND POSITIVE.
 0091                        27,2716  73406 1             PUSH    SIN             .5*SIN(2*PI*Y/365.25)
 0092                        27,2717  71525 0             PDDL    COS             .5*COS(2*PI*Y/365.25)

A0093                                                   COMPUTE (1/8 +LOS) IN REVOLUTIONS WHERE
A0094                                                   LOS= LOS0+LOSR*T-C0Y*SIN(2*PI*Y/365.25)-C1Y*COS(2*PI*Y/365.25) .
A0095                                                   LOS = LONGITUDE OF SUN IN PLANE OF ECLIPTIC.

 0096                        27,2720  65205 0             DMP     PDDL
 0097   REF   1              27,2721  17073 0                     C1Y             .5*C1Y*COS/2
 0098                        27,2722  43205 1             DMP     DAD
 0099   REF   1              27,2723  17071 1                     C0Y             (C0Y*SIN +C1Y*COS)/4
 0100                        27,2724  77725 1             PDDL                    T/2**9
 0101                        27,2725  54205 1             DMP     SL
 0102   REF   1              27,2726  17067 0                     LOSR            LOSR*T/2**9
 0103                        27,2727  20210 0                     7               LOSR*T/4
 0104                        27,2730  77625 0             DSU                     (LOSR*T-C0Y*SIN-C1Y*COS)/4
 0105                        27,2731  43215 0             DAD     DAD
 0106   REF   1              27,2732  17065 1                     LOS0            LOS/4= (LOS0+LOSR*T-C0Y*SIN-C1Y*COS)/4
```

L MISSION PHASE 8 - DPS COLD SOAK USER'S OWN PAGE NO. 6 S3 E3

```
 0107   REF  1              27,2733  17107 1                 EGHTH       (1/8 +LOS)/4  ,  1/8 REV = 45 DEG

 0108                       27,2734  51025 1  ALTB    DSU    BPL         DIMINISH (1/8 +LOS)/4 REVS BY (1REV)/4
 0109   REF  1              27,2735  17105 0                 ONEREV      UNTIL A NEGATIVE RESULT OCCURS.
 0110   REF  1              27,2736  56734 1                 ALTB
 0111                       27,2737  62415 0          DAD    SL2         ADD BACK (1REV)/4 .
 0112   REF  2 LAST 725     27,2740  17105 0                 ONEREV      AND MULTIPLY BY FOUR.
 0113                       27,2741  77606 1          PUSH               (1/8 +LOS) POSITIVE AND LESS THAN ONE.

A0114                                        CONSTRUCT TRANSFORMATION MATRIX FROM RCS COLD SOAK ATTITUDE
A0115                                        TO EARTH REFERENCE COORDINATES.  MATRIX IS SCALED BY -1 .
A0116                                        MATRIX TRANSPOSE IS STORED STARTING IN FIRST LOCATION OF PUSHDOWN LIST.
A0117                                        OBL= OBLIQUITY= ANGLE BETWEEN ECLIPTIC AND EQUATORIAL PLANES.
A0118                                        DEFINE LOSR= 2*PI*LOS

 0119                       27,2742  57546 1          COS    DCOMP
 0120                       27,2743  00007 0          STORE  6           -.5*COS(PI/4+LOSR)
 0121                       27,2744  77605 1          DMP
 0122   REF  1              27,2745  17077 1                 COSOBL
 0123                       27,2746  00017 1          STORE  14D         -.5*COS(PI/4+LOSR)*COS(OBL)
 0124                       27,2747  77605 1          DMP
 0125   REF  1              27,2750  17101 1                 TANOBL
 0126                       27,2751  14021 1          STODL  16D         -.5*COS(PI/4+LOSR)*SIN(OBL)
 0127                       27,2752  00001 0                 0
 0128                       27,2753  77756 0          SIN
 0129                       27,2754  00015 0          STORE  12D          .5*SIN(PI/4+LOSR)
 0130                       27,2755  57405 1          DMP    DCOMP
 0131   REF  2 LAST 725     27,2756  17077 1                 COSOBL
 0132                       27,2757  00011 1          STORE  8D          -.5*SIN(PI/4+LOSR)*COS(OBL)
 0133                       27,2760  77605 1          DMP
 0134   REF  2 LAST 725     27,2761  17101 1                 TANOBL
 0135                       27,2762  14013 0          STODL  10D         -.5*SIN(PI/4+LOSR)*SIN(OBL)
 0136   REF  3 LAST 725     27,2763  17077 1                 COSOBL
 0137                       27,2764  77742 0          SR1
 0138                       27,2765  14005 1          STODL  4            .5*COS(OBL)
 0139   REF  1              27,2766  17075 0                 SINOBL
 0140                       27,2767  57542 0          SR1    DCOMP
 0141                       27,2770  14003 1          STODL  2           -.5*SIN(OBL)
 0142   REF  2 LAST 679     27,2771  17103 0                 DPZRO
 0143                       27,2772  00001 0          STORE  0            0

A0144                                        PERFORM THE MATRIX MULTIPLICATION (REFSMMAT)X(RCS TO REF MATRIX)/2
 0145                       27,2773  64375 1          VLOAD  MXV
 0146                       27,2774  00001 0                 0
 0147   REF  18 LAST 679    27,2775  01263 1                 REFSMMAT
 0148                       27,2776  77772 0          VSL1
 0149                       27,2777  24001 0          STOVL  0
 0150                       27,3000  00007 0                 6
 0151                       27,3001  76521 0          MXV    VSL1
 0152   REF  19 LAST 725    27,3002  01263 1                 REFSMMAT
```

L MISSION PHASE 8 - DPS COLD SOAK USER'S OWN PAGE NO. 7 S3 E3

```
0153                        27,3003  24007 0        STODL   6
0154                        27,3004  00015 0                120
0155                        27,3005  76521 0        MXV     VSL1
0156  REF  20 LAST 725      27,3006  01263 1                REFSMMAT
0157                        27,3007  00015 0        STORE   120
0158                        27,3010  77776 1        EXIT

A0159                                              TRANSPOSE RESULTING DIRECTION COSINE MATRIX.

0160  REF  20 LAST 454      27,3011  50 110 1       INDEX   FIXLOC
0161                        27,3012  52 003 0       DXCH    2
0162  REF  21 LAST 726      27,3013  50 110 1       INDEX   FIXLOC
0163                        27,3014  52 007 1       DXCH    6
0164  REF  22 LAST 726      27,3015  50 110 1       INDEX   FIXLOC
0165                        27,3016  52 003 0       DXCH    2
0166  REF  23 LAST 726      27,3017  50 110 1       INDEX   FIXLOC
0167                        27,3020  52 005 0       DXCH    4
0168  REF  24 LAST 726      27,3021  50 110 1       INDEX   FIXLOC
0169                        27,3022  52 015 1       DXCH    12D
0170  REF  25 LAST 726      27,3023  50 110 1       INDEX   FIXLOC
0171                        27,3024  52 005 0       DXCH    4
0172  REF  26 LAST 726      27,3025  50 110 1       INDEX   FIXLOC
0173                        27,3026  52 013 1       DXCH    10D
0174  REF  27 LAST 726      27,3027  50 110 1       INDEX   FIXLOC
0175                        27,3030  52 017 0       DXCH    14D
0176  REF  28 LAST 726      27,3031  50 110 1       INDEX   FIXLOC
0177                        27,3032  52 013 1       DXCH    10D
0178  REF  52 LAST 724      27,3033  0 6112 0       TC      INTPRET

A0179                                              CALL ROUTINE TO CONVERT DIRECTION COSINE MATRIX TO CDU ANGLES.

0180                        27,3034  74001 0        SETPD   AXC,1
0181                        27,3035  00023 0                18D
0182                        27,3036  00000 1                0
0183                        27,3037  77624 1        CALL
0184  REF   3 LAST 668      27,3040  70711 1                DCMTOCDU

A0185                                              CONVERT CDU ANGLES FROM ONES TO TWOS COMPLEMENT.

0186                        27,3041  47131 1        SSP     RTB
01862 REF   7 LAST 722      27,3042  01653 0                RATEINDX
01864                       27,3043  00004 0                4               CODE FOUR = MANEUVER RATE OF 5 DEG/SEC.
0187  REF   4 LAST 668      27,3044  33526 0                VLSTO2S           STORE CDU ANGLES IN CONSECUTIVE
0188  REF   7 LAST 672      27,3045  01632 1        STORE   CPHI              LOCATIONS  CPHI,CTHETA,CPSI.
0189                        27,3046  77776 1        EXIT

A0190                                              SET UP PARAMETERS FOR KALCMANU MANEUVER ROUTINE

0193  REF   5 LAST 710      27,3047  0 6076 0       TC      FLAGDWN           RESET STATE SWITCH 33 (BIT 12)
0194                        27,3050  04000 0        OCT     04000             FOR FINAL ROLL , IF ANY.
```

L MISSION PHASE 8 - DPS COLD SOAK USER'S OWN PAGE NO. 8 S3 E3

```
 0195   REF  3 LAST 683   27,3051  0 6060 1          TC     FLAG2UP         SET BIT FOR KALCMANU
019501                    27,3052   02000 0          OCT    02000           BIT 11

01951   REF  58 LAST 722  27,3053  0 4161 0          TC     PHASCHNG
01953                     27,3054   05024 1          OCT    05024
01955                     27,3055   20000 0          OCT    20000

01957   REF  1            27,3056  3 7746 0 COLDSK1  CAF    PRIOKM          SCHEDULE KALCMANU
01959                     27,3057  0 0004 0          INHINT
01961   REF  19 LAST 722  27,3060  0 5516 0          TC     FINDVAC
01963   REF  8 LAST 726                E3           EBANK= RATEINDX
01965                     27,3061   02067 1          2CADR  KALCMAN3
C01965  REF  3 LAST 645   27,3062   70063 0
01967   REF  78 LAST 721  27,3063  0 5567 0          TC     ENDOFJOB

 0197                     27,3064   02142 1 LOS0     2DEC   .273926331 B-2      1966-67,IN REVOLUTIONS
C0197                     27,3065   00045 0
 0198                     27,3066   00054 0 LOSR     2DEC   .0027377992         1966-67,IN REVOLUTIONS
C0198                     27,3067   33312 1
 0199                     27,3070   00053 1 COY      2DEC   .005306583 B-1      1966-67,IN REVOLUTIONS
C0199                     27,3071   17056 1
 0200                     27,3072   77774 0 C1Y      2DEC   -.000402139 B-1     1966-67,IN REVOLUTIONS
C0200                     27,3073   66451 1
 0201                     27,3074   14566 1 SINOBL   2DEC   .397845753          1966-67
C0201                     27,3075   11602 0
 0202                     27,3076   35267 1 COSOBL   2DEC   .917452318          1966-67
C0202                     27,3077   21173 1
 0203                     27,3100   15700 1 TANOBL   2DEC   .433441885          1966-67
C0203                     27,3101   31171 1
 0204                     27,3102   00000 1 DPZRO    2DEC   0
C0204                     27,3103   00000 1
 0205                     27,3104   10000 0 ONEREV   2DEC   .999999999 B-2
C0205                     27,3105   00000 1
 0206                     27,3106   01000 0 EGHTH    2DEC   .125 B-2
C0206                     27,3107   00000 1
 0207                     27,3110   26650 0 ONEYR    2DEC   365.25 B-9
C0207                     27,3111   00000 1
 0208                     27,3112   00020 0 CSPERDAY 2DEC   8640000 B-33       CENTISEC PER DAY
C0208                     27,3113   17260 0
R0214   END OF MISSION PHASE 8
```

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L       MP9-DPS 1 BURN                                                  USER'S OWN PAGE NO.  1          S3

R0001   MISSION PHASE 9

 0002                                  33,2724          BANK   33
 0003   REF  37 LAST 719                 E4             EBANK= TDEC
R0004   PROGRAM DESCRIPTION-MISSION PHASE9-DPS1 BURN                                DATE=28 OCT 66
R0006   MOD NO=2                                                                    LOG SECTION-MP9
R0008   MOD BY- CHO                                                                 ASSEMBLY-SUNBURST REV24

R0010   FUNCTIONAL DESCRIPTION
R0011           THIS PHASE IS STARTED 3HOUR 1MIN AND 49SECS AFTER THE TERMINATI ON OF SIVB/LEM SEPARATION +X TRANSLATI
R0013   ON AND BY THE INITIATION OF PROGRAM 31 (PRE-DPS1 BURN). PROGRAM 31      CALLS FOR DPS CUTOFF TDI 5MIN AND
R0015   15SECS LATER. IN ORDER TO ALIGN THE VEHICLE THRUST AXIS ALONG THE DESIRED ACCELERATION VECTOR DURING PRE-DPS1
R0017   PHASE, THE FOLLOWING COMPUTATIONS ARE MADE - VEHICLE STATE VECTOR FORWARD INTEGRATION TO THE DESCENT
R0019   INJECTION CUTOFF TIME TDI, VELOCITY TO BE GAINED VG, THE MANEUVER THRUST TIME TTHRUST, DPS1 IGNITION TIME TIGN
R0021   AND FINALLY DESIRED THRUST DIRECTION UNITVG. PROGRAM 31 ALSO COMMANDS LANDING GEAR DEPLOYMENT AND CALL FOR
R0023   A MANEUVER TO THE FIRING ATTITUDE.
R0024           PROGRAM 41, DPS1 BURN IS STARTED 36SECS BEFORE IGNITION. THIS PROGRAM ARMS THE DESCENT ENGINE,
R0026   COMMANDS +X TRANSLATION AND COMMANDS ENGINE ON. DURING THE BURN, THE VELOCITY TO BE GAINED AND TIME TO
R0028   CUTOFF TGO ARE COMPUTED EVERY TWO SECONDS. WHEN TGO FALLS BELOW THE CRITICAL VALUE ENGINE OFF SIGNAL COUNTER
R0030   IS SET. WHEN POST ENGINE CUTOFF ROUTINE IS PERFORMED, MPENTRY NO.1 IS SET TO START MP11 IN 31MIN 11SECS.

R0032   CALLING SEQUENCE- AFTER THE TERMINATION OF SIVB/LEM SEPARATION +X TRANSLATION AND BY THE INITIATION OF
R0034   PROGRAM 31.

R0035   NORMAL EXIT MODES- TASKOVER (AWAITS MPENTRY INTO MP11 VIA NO.1)

R0036   ALARM EXIT MODE- NONE

R0037   SUBROUTINES CALLED- FIXDELAY, 1LMP, 2LMP, EXECUTIVE, MIDTOAVE, BANKCALL, IBNKCALL, WAITLIST, KALCMANU,
R0039   UL4JETON, UL4JETOFF, ENGINEON, ENGINOFF, NEWMODEX, DFITCAL, RVUPDADR, TPAGREE, TASKOVER, ENDOFJOB, ENGDF1
R0041

R0042   INPUT- RN, VN, RP, MUEARTH, TDI

R0043   OUTPUT- VG, TTHRUST, TIGN, UNITVG, TGO

R0044   ERASABLE INITIALIZATION REQUIRED-

R0045   DEBRIS- TDEC

 0046   REF  17 LAST 683      33,2724  3 7753 1  MP9JOB   CAF     BIT9
 0047   REF   8 LAST 721      33,2725  0 4105 1           TC      SETRSTRT        SET RESTART FLAG

 0048   REF  20 LAST 721      33,2726  0 4117 1           TC      NEWMODEX        DISPLAY PROG. NO.
 0049                         33,2727   00031 0           OCTAL   31

 0050   REF  98 LAST 728                E4               EBANK= TDEC
 0051                         33,2730  0 0006 1           EXTEND
 0052   REF  29 LAST 724      33,2731  3 0025 0           DCA     TIME2           PICK UP CURRENT TIME
 0053   REF   1               33,2732  53'666 1           DXCH    TDI
```

L MP9-DPS 1 BURN USER'S OWN PAGE NO. 2 S3 E4

```
0054                        33,2733  0 0006 1          EXTEND
0055  REF   1              33,2734  3 3502 0          DCA     5M15S
0056  REF   2 LAST 728     33,2735  21,666 1          DAS     TDI          SET TDI=TIME2+5M15S

0057  REF   1              33,2736  3 3465 0          CAF     EQJ2ADR      SET COMPUTATIINAL STEPS
0058  REF   1              33,2737  55,662 0          TS      SHJJMP1

0059  REF   69 LAST 727    33,2740  0 4161 0          TC      PHASCHNG
0060                       33,2741   05022 1          OCT     05022
0061                       33,2742   20000 0          OCT     20000

0062                       33,2743  0 0006 1          EXTEND
0063  REF   3 LAST 729     33,2744  3 1666 0          DCA     TDI
0064  REF   99 LAST 728    33,2745  53,567 0          DXCH    TDEC
0065                       33,2746  0 0006 1          EXTEND
0066  REF   1              33,2747  3 3474 0          DCA     RVJPDADR     STATE VECTOR UPDATE FOR PRE-DPS1 BURN
0067  REF   22 LAST 713    33,2750  52 006 0          DXCH    Z

0068  REF   70 LAST 729    33,2751  0 4161 0          TC      PHASCHNG
0069                       33,2752   04022 0          OCT     04022

0070  REF   63 LAST 726    33,2753  0 6112 0          TC      INTPRET
0071                       33,2754   77624 1          CALL
0072  REF   2 LAST 700     33,2755   60436 0                  VPATCHER     RESCALE AND LOAD TDI STATES IN RN AN VN
0073                       33,2756   77650 1          GOTO
0074  REF   1              33,2757   67420 0                  DPS1EQU1 +1  COMPUTES VELOCITY TO BE GAINED.

0075                       33,2760   77745 1  DPS1EQJ2 DLOAD               COMPUTES MANEUVER THRUST TIME
0076  REF   1              33,2761   00045 0          LV      ABVAL(VG)
0077                       33,2762   45261 0  SR      DSJ
0078                       33,2763   20613 1          10D     NOW VG SCALED AT 2(+17)M/CS
0079  REF   1              33,2764   27504 0          DPA
0080                       33,2765   43271 1  DDV     DAD
0081  REF   1              33,2766   27506 1          DPB
0082  REF   1              33,2767   27510 0          DPC
0083  REF   1              33,2770   26264 0  STODL   TTHRUST     SCALED AT 2(+28)CS
0084  REF   1              33,2771   02272 1          UNITVG
0085  REF   3 LAST 702     33,2772   25656 0  STODL   POINTVSM     KALCMANU INPUT REGISTER
0086  REF   2 LAST 702     33,2773   26641 0          BODYVECT     LOAD BODY AXES VECTOR IN SM COORD.
0087  REF   6 LAST 702     33,2774   01664 1  STORE   SCAXIS       KALCMANU INPUT VECTOR
0088                       33,2775   66214 0  SET     SSP
0089                       33,2776   01063 0          33D
0090  REF   9 LAST 727     33,2777   01653 0          RATEINDX
0091                       33,3000   00004 0          4            SET KALCMANU FOR ANGULAR RATE OF 5DEG/S
0092                       33,3001   77776 1  EXIT

0093  REF   71 LAST 729    33,3002  0 4161 0          TC      PHASCHNG
0094                       33,3003   04022 0          OCT     04022

0095                       33,3004  0 0004 0          INHINT
```

L MP9-D26 1 BURN USER'S OWN PAGE NO. 3 S3 E4

```
0096                        33,3005  0 0006 1          EXTEND
0097   REF   2 LAST 729     33,3006  4 1664 0          DCS    TTHRUST      COMPUTES TIGN
0098   REF   4 LAST 698     33,3007  53'670 0          DXCH   TIGN

0099                        33,3010  0 0006 1          EXTEND
0100   REF   4 LAST 729     33,3011  3 1666 0          DCA    TDI
0101   REF   5 LAST 730     33,3012  21'670 0          DAS    TIGN         TIGN=TDI-TTHRUST  (SCALED AT 2(+28)CS)
0102   REF   1               33,3013  3 3466 0          CAF    EQUJADR
0103   REF   2 LAST 729     33,3014  55'662 0          TS     SHJJMP1

0104   REF   1               33,3015  3 3521 1          CAF    70SECS9      CALL POSTKALC 70 SECS LATER
0105   REF  34 LAST 721     33,3016  0 5663 1          TC     WAITLIST
0106   REF 100 LAST 729                    E4          EBANK= TDEC
0107                        33,3017   03036 1          2CADR  POSTKALC
C0107  REF   3 LAST  65     33,3020   66064 0
0108   REF  72 LAST 729     33,3021  0 4161 0          TC     PHASCHNG
0109                        33,3022   40042 0          OCT    40042

0110                        33,3023  0 0004 0 CALLKALC INHINT
0111   REF   6 LAST 703     33,3024  3 5642 1          CAF    PRIO16       CALL KALCMANU JOB.
0112   REF  20 LAST 727     33,3025  0 5516 0          TC     FINDVAC
0113   REF  21 LAST 703                    E3          EBANK= MIS
0114                        33,3026   02001 1          2CADR  VECPOINT
C0114  REF   2 LAST 703     33,3027   70063 0
0115   REF 125 LAST 722     33,3030  0 5206 0          TC     BANKCALL
0116   REF   3 LAST 722     33,3031   26743 0          CADR   ATTSTALL     SEE IF KALCMANU FINISHED
0117   REF   4 LAST 722     33,3032  0 4743 0 CJRT9    TC     CJRTAINS     UNFINISHED MANEUVER

0118   REF  73 LAST 730     33,3033  0 4161 0          TC     PHASCHNG
0119                        33,3034   00432 1          OCT    00432        2.43 FOR POSTKALC.  DON'T RESET T3ASE.

0120   REF  79 LAST 727     33,3035  1 5567 1          TCF    ENDOFJOB     GOOD RETURN- END MP9JOB

0121   REF  15 LAST 722     33,3036  4 0076 1 POSTKALC CS     FLAGWRD2     CHECK WHETHER KALCMANU IS FINISHED.
0122   REF  34 LAST 722     33,3037  7 7751 1          MASK   BIT11
0123   REF 298 LAST 688     33,3040  10 000 0          CCS    A

0124   REF   1               33,3041  0 3047 1          TC     GOODKALC     GOOD RETURN

0125   REF   5 LAST 695     33,3042  3 5660 1          CAF    PRIO37       BAD RETURN
0126   REF  21 LAST 730     33,3043  0 5516 0          TC     FINDVAC
0127   REF 101 LAST 730                    E4          EBANK= TDEC
0128                        33,3044   03032 0          2CADR  CJRT9
C0128  REF   1               33,3045   66064 0
0129   REF  79 LAST 722     33,3046  0 5727 0          TC     TASKOVER     END POSTKALC TASK

0130   REF  39 LAST 722     33,3047  0 5101 1 GOODKALC TC     1LMP+DT
0131                        33,3050   00354 0          DEC    236          DFI T/M CALIBRATE - ON *
0132                        33,3051   02260 1          DEC    1200
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L MP9-DPS 1 BURN USER'S OWN PAGE NO. 4 S3 E4

```
0133  REF  19 LAST 722   33,3052  0 5073 0          TC     2LMP.DT
0134                     33,3053    00355 1         DEC    237          DFI T/M CALIBRATE - OFF *
0135                     33,3054    00306 1         DEC    198          MASTER C&W ALARM RESET - COMMAND **
0136                     33,3055    00310 0         DEC    200

0137  REF  40 LAST 730   33,3056  0 5101 1          TC     1LMP.DT
0138                     33,3057    00307 0         DEC    199          MASTER C&W ALARM RESET - COMMAND RESET
0139                     33,3060    00001 0         DEC    1

0140                     33,3061  0 0006 1          EXTEND              CALL DPS1 BURN PROG. AT TIGN-36SECS.
0141  REF  30 LAST 728   33,3062  4 0025 1          DCS    TIME3
0142  REF  76 LAST 708   33,3063    52 062 1        DXCH   ITEMP1
0143                     33,3064  0 0006 1          EXTEND
0144  REF   6 LAST 730   33,3065  3 1670 1          DCA    TIGN
0145  REF  77 LAST 731   33,3066    20 062 1        DAS    ITEMP1
0146                     33,3067  0 0006 1          EXTEND
0147  REF   1            33,3070  4 3500 0          DCS    66SECSD9
0148  REF  78 LAST 731   33,3071    20 062 1        DAS    ITEMP1
0149                     33,3072  0 0006 1          EXTEND
0150  REF  79 LAST 731   33,3073  3 0062 0          DCA    ITEMP1
0151  REF  10 LAST 700   33,3074    53,305 1        DXCH   TDECTEMP     FOR RESTARTS.
0152  REF  80 LAST 731   33,3075    52 062 1        DXCH   ITEMP1

0153  REF   4 LAST 710   33,3076  0 5741 0          TC     LONGCALL
0154  REF 102 LAST 730             E4              EBANK= TDEC
0155                     33,3077    03134 1         2CADR  TIG9-66
C0155 REF   3 LAST  67   33,3100    66064 0
0156  REF  74 LAST 730   33,3101  0 4161 0          TC     PHASCHNG
0157                     33,3102    20134 0         OCT    20134        4.13 FOR TIG9-66 LONGCALL.

0158  REF   1            33,3103  3 3520 0          CAF    11SECS9
0159  REF  35 LAST 730   33,3104  0 5663 1          TC     WAITLIST
0160  REF 103 LAST 731             E4              EBANK= TDEC
0161                     33,3105    03112 0         2CADR  182LMP
C0161 REF   2 LAST  65   33,3106    66064 0
0162  REF  75 LAST 731   33,3107  0 4161 0          TC     PHASCHNG
0163                     33,3110    40452 0         OCT    40452        2.45 FOR 182LMP TASK.

0164  REF  80 LAST 730   33,3111    1 5727 1        TCF    TASKOVER     END GOODKALC TASK

0165  REF  20 LAST 731   33,3112  0 5073 0  182LMP  TC     2LMP.DT
0166                     33,3113    00266 0         DEC    182          LANDING RADAR POWER ON
0167                     33,3114    00032 0         DEC    26           RADAR SELF TEST-ON
0168                     33,3115    11444 0         DEC    4900

0169  REF  41 LAST 731   33,3116  0 5101 1          TC     1LMP.DT
0170                     33,3117    00004 0         DEC    4            ED BATTERY ACTIVATION -ON
0171                     33,3120    00764 1         DEC    500

0172  REF  42 LAST 731   33,3121  0 5101 1          TC     1LMP.DT
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L MP9-DP5 1 BURN USER'S OWN PAGE NO. 5 53 E4

```
0173                        33,3122  00010 0          DEC   8          LANDING GEAR DEPLOY -FIRE
0174                        33,3123  00310 0          DEC   200

0175  REF  43 LAST 731     33,3124  0 5101 1         TC    1LMP,DT
0176                        33,3125  00011 1          DEC   9          LANDING GEAR DEPLOY- FIRE RESET
0177                        33,3126  00620 0          DEC   400

0178  REF   7 LAST 710     33,3127  0 5060 1         TC    1LMP
0179                        33,3130  00033 1          DEC   27         RADAR SELF-TEST - OFF.

0180  REF  76 LAST 731     33,3131  0 4161 0         TC    PHASCHNG
0181                        33,3132  00002 0          OCT   00002      GROUP 2 OFF.

0182  REF  31 LAST 731     33,3133  0 5727 0         TC    TASKOVER   END 182LMP TASK

0183  REF  21 LAST 728     33,3134  0 4117 1 TIG9-66 TC    VEHMODEX   DISPLAY PROGRAM NUMBER ON DSKY
0184                        33,3135  00041 1          OCT   41

0185  REF  62 LAST 717     33,3136  0 5270 1         TC    IBNKCALL
0186  REF   4 LAST 703     33,3137  40277 1          CADR  ENGINOF1

0187  REF   2 LAST 680     33,3140  0 5052 0         TC    2LMP
0188                        33,3141  00226 1          DEC   150        ENGINE SELECT DESC ARM
0189                        33,3142  00126 1          DEC   86         MANUAL THROTTLE ON (10PERCENT)

0190  REF   1               33,3143  3 3516 0         CAF   30SECS9
0191  REF  96 LAST 731      33,3144  0 5663 1         TC    WAITLIST
0192  REF 104 LAST 731                   E4          EBANK= TDEC
0193                        33,3145  03450 0          2CADR 228LMP
C0193 REF   2 LAST  65      33,3146  66064 0
0194  REF   6 LAST 700      33,3147  3 5651 0         CAF   PRIO27
0195  REF  22 LAST 730      33,3150  0 5516 0         TC    FINDVAC
0196  REF 105 LAST 732                   E4          EBANK= TDEC
0197                        33,3151  03157 1          2CADR ORBINTJB
C0197 REF   2 LAST  67      33,3152  66064 0
0198  REF  27 LAST 722      33,3153  0 4141 1         TC    2PHSCHNG
0199                        33,3154  40472 1          OCT   40472      2.47 FOR 228LMP TASK.
0200                        33,3155  00154 1          OCT   00154      4.15 FOR ORBINTJB JOB.

0201  REF  82 LAST 732      33,3156  1 5727 1         TCF   TASKOVER   END TIG9-66 TASK

0202                        33,3157  0 0006 1 ORBINTJB EXTEND
0203  REF   7 LAST 731      33,3160  3 1670 1         DCA   TIGN
0204  REF 106 LAST 732      33,3161  53'567 0         DXCH  TDEC
0205  REF   1               33,3162  4 3517 0         CS    30SECS9
0206  REF 145 LAST 708      33,3163  54 001 1         TS    L
0207  REF 229 LAST 724      33,3164  4 7767 1         CS    ZERO
0208  REF 107 LAST 732      33,3165  21'567 0         DAS   TDEC       TDEC NOW CONTAINS TIGN-30 SECS.

0209                        33,3166  0 0006 1         EXTEND
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L MP9-DPS 1 BURN USER'S OWN PAGE NO. 6 S3 E4

```
0210   REF   2 LAST 700    33,3167  3 2654 1          DCA    ORBINTAD
0211   REF  23 LAST 729    33,3170  52 006 0          DXCH   Z

0212.  REF  77 LAST 732    33,3171  0 4161 0          TC     PHASCHNG
0213                       33,3172    05024 1         DCT    05024
0214                       33,3173    27000 1         DCT    27000

R0215  RN AND VN IN STABLE MEMBER COORDINATES. SCALING IS AS IN AVEG.

R0216          DELETE
0217   REF   2 LAST 702    33,3174  3 2646 1          CAF    AVGENADR
0218   REF  13 LAST 714    33,3175  55'310 0          TS     DVSELECT       SELECT AGS MONITOR

0219                       33,3176  0 0006 1          EXTEND
0220.  REF   2 LAST 702    33,3177  3 2652 1          DCA    EXITADR
0221   REF   9 LAST 714    33,3200  53'073 0          DXCH   AVGEXIT        SET AVERAGEG EXIT

0222                       33,3201  0 0006 1          EXTEND
0223   REF   1             33,3202  3 3472 0          DCA    MP9IM1AD
0224   REF   6 LAST 702    33,3203  53'075 0          DXCH   DVMNEXIT       SET MONITOR EXIT

0225                       33,3204  0 0004 0          INHINT
0226   REF   2 LAST 732    33,3205  4 3517 0          CS     30SECS9        CALL PREREAD AT TIGN-30SECS.
0227   REF   1              33,3206  0 2663 0          TC     TASKSETR
0228   REF   2 LAST  69    33,3207  55'342 1          TS     RSDTTEMP       FOR RESTARTS.
0229   REF  97 LAST 732    33,3210  0 5663 1          TC     WAITLIST
0230   REF   5 LAST 719                E5             EBANK= DVTOTAL
0231                       33,3211    02000 0         2CADR  PREREAD
C0231  REF   7 LAST 719    33,3212    60065 1
0232   REF  28 LAST 732    33,3213  0 4141 1          TC     2PHSCHNG
0233                       33,3214    40355 0         DCT    40355          5.35 FOR PREREAD.
0234                       33,3215    04024 0         DCT    04024

0235                       33,3216  0 0004 0          INHINT
0236   REF 230 LAST 732    33,3217  4 7767 1          CS     ZERO           CALL TVC FOR DPS1 AT IGNITION TIME
0237   REF   2 LAST 733    33,3220  0 2663 0          TC     TASKSETR
0238   REF  11 LAST 731    33,3221  55'305 1          TS     TDECTEMP +1    FOR RESTARTS.
0239   REF  98 LAST 733    33,3222  0 5663 1          TC     WAITLIST
0240   REF  10 LAST 733                E2             EBANK= AVGEXIT
0241                       33,3223    03230 0         2CADR  TIG9-0
C0241  REF   2 LAST  67    33,3224    66062 0
0242   REF  78 LAST 733    33,3225  0 4161 0          TC     PHASCHNG
0243                       33,3226    40174 1         DCT    40174          4.17 FOR TIG9-0.

0244   REF  80 LAST 730    33,3227  1 5567 1          TCF    ENDOFJOB       END ORBITAL INTEGRATION JOB

0245                       33,3230  0 0006 1 TIG9-0   EXTEND
0246   REF   1             33,3231  3 3470 1          DCA    EQU1ADR
0247   REF  11 LAST 733    33,3232  53'073 0          DXCH   AVGEXIT        AVG ROUTINE GOES TO VG COMPUTATION
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L MP9-DPS 1 BURN USER'S OWN PAGE NO. 7 S3 E4

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0248  REF  53 LAST 732   33,3233  0 5270 1          TC     IBNKCALL
0249  REF   4 LAST 704   33,3234    40226 0         CADR   DPSENGON

0250  REF  29 LAST 733   33,3235  0 4141 1          TC     2PHSCHNG
0251                     33,3236    00004 0         OCT    00004
0252                     33,3237    40512 0         OCT    40512          2,51 FOR 9ULLOFF TASK.

0253  REF  49 LAST 717   33,3240  0 5701 1          TC     FIXDELAY
0254                     33,3241    00062 0         DEC    50

0255  REF  54 LAST 734   33,3242  0 5270 1  9ULLOFF  TC     IBNKCALL
0256  REF   8 LAST 717   33,3243    40066 0         CADR   NOULLAGE       +X TRANSLATION- OFF

0257  REF  79 LAST 733   33,3244  0 4161 0          TC     PHASCHNG
0258                     33,3245    40532 1         OCT    40532          2,53 FOR 9EDBATT.

0259  REF  50 LAST 734   33,3246  0 5701 1          TC     FIXDELAY
0260                     33,3247    00372 1         DEC    250

0261  REF  44 LAST 732   33,3250  0 5101 1  9EDBATT  TC     1LMP,DT
0262                     33,3251    00005 1         DEC    5              ED BATTERY ACTIVATION-SAFE
0263                     33,3252    04374 0         DEC    2300

0264  REF  30 LAST 734   33,3253  0 4141 1          TC     2PHSCHNG
0265                     33,3254    00002 0         OCT    2
0266                     33,3255    05014 1         OCT    05014          THROTTLE PROGRAM TAKES OVER GP 4.
0267                     33,3256    77777 0         OCT    77777

0268  REF  41 LAST 715   33,3257  3 7743 0          CAF    POSMAX         CALL FOR MAXIMUM THRUST.
0269  REF   3 LAST 705   33,3260  55'323 0          TS     PCNTF
0270                     33,3261  0 0006 1          EXTEND
0271  REF   2 LAST 705   33,3262  3 2656 0          DCA    PCNTFMAD
0272                     33,3263    52 006 0        DTCB

0273  REF  83 LAST 732   33,3264  1 5727 1          TCF    TASKOVER       END TIG9-0 TASK

0274                     33,3265    77624 1  DPS1EQU3 CALL
0275  REF   1            33,3266    67277 1                 CALCTGO
0276                     33,3267    77775 1         VLOAD
0277  REF   2 LAST 729   33,3270    02272 1                 UNITVG
0278  REF   2 LAST 702   33,3271    02233 1         STORE  AXISD          FINDCDUD INPUT
0279                     33,3272    77624 1         CALL
0280  REF   2 LAST 708   33,3273    60703 0                 FINDCDUD

0281                     33,3274    77776 1         EXIT
0282  REF  41 LAST 705   33,3275  0 5225 1          TC     POSTJUMP
0283  REF   6 LAST 719   33,3276    60324 1         CADR   SERVEXIT

0284                     33,3277    45345 1  CALCTGO  DLOAD  DSU
0285  REF   2 LAST 729   33,3300    00045 0                 LV             ABVAL(VG)
```

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```
0286  REF  1                33,3301   03574 1                VTAITOFF
0287                        33,3302   56205 0          DMP   DDV
0288  REF  1                33,3303   27512 1                DELTAT9
0289  REF  6 LAST 614       33,3304   02535 0                ABDELV
0290  REF  4 LAST 335       33,3305   02346 1          STORE TTGO          FOR DWLK ONLY

0291                        33,3306   44234 1          RTB   BDSU
0292  REF  3 LAST 398       33,3307   33454 1                LOADTIME
0293  REF  2 LAST 685       33,3310   01307 1                PIPTIME
0294                        33,3311   47015 0          DAD   RTB
0295  REF  5 LAST 735       33,3312   02346 1                TTGO
0296  REF  9 LAST 678       33,3313   33520 0                SGNAGREE
0297  REF  3 LAST 701       33,3314   02141 1          STORE TGO

0298                        33,3315   51025 1          DSU   BPL
0299  REF  1                33,3316   27476 1                4SECSD9
0300  REF  1                33,3317   00052 0                DPRET
0301                        33,3320   77776 1          EXIT

0302                        33,3321   0 0004 0         INHINT
0303  REF  4 LAST 735       33,3322   31'541 0         CAE   TGO +1
0304                        33,3323   0 0006 1         EXTEND
0305  REF  1                33,3324   6 3347 1         BZMF  CUTOFF2       CUT OFF ENGINE IMMEDIATELY IF TGO NEG
0306  REF  12 LAST 733      33,3325   55'304 0  CUTOFF1 TS    TDECTEMP      FOR RESTARTS.
0307  REF  39 LAST 733      33,3326   0 5663 1         TC    WAITLIST
0308  REF  15 LAST 672                 E1               EBANK= CDUXD
0309                        33,3327     03340 0        2CADR CUTOFF
C0309 REF  2 LAST  65       33,3330     66061 0
0310                        33,3331   0 0006 1         EXTEND              STOPS GUIDANCE EQUATION LOOP
0311  REF  3 LAST 733       33,3332   3 2652 1         DCA   EXITADR
0312  REF  12 LAST 733      33,3333   53'073 0         DXCH  AVGEXIT

0313  REF  31 LAST 734      33,3334   0 4141 1         TC    2PHSCHNG
0314                        33,3335    40552 1         DCT   40552         2.55 FOR CUTOFF TASK.
0315                        33,3336    00035 1         DCT   00035         5.3 FOR SERVICER.

0316  REF  31 LAST 733      33,3337   1 5567 1         TCF   ENDOFJOB       END DPS1 BURN EQUATION JOB

0317  REF  65 LAST 734      33,3340   0 5270 1  CUTOFF TC    IBNKCALL
0318  REF  7 LAST 694       33,3341    40263 1         CADR  ENGINOFF

0319  REF  56 LAST 735      33,3342   0 5270 1         TC    IBNKCALL
0320  REF  8 LAST 717       33,3343    40114 1         CADR  STOPRATE      HOLD VEHICLE ATTITUDE

0321  REF  80 LAST 734      33,3344   0 4161 0         TC    PHASCHNG
0322                        33,3345    00002 0         DCT   2             2 OFF.  SERVICER TO RETURN TO MP9TERM1.

0323  REF  84 LAST 734      33,3346   1 5727 1         TCF   TASKOVER      END CUTOFF TASK

0324  REF  54 LAST 719      33,3347   3 7763 1  CUTOFF2 CAF   BIT1
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```
0325  REF   1              33,3350  1 3325 1          TCF     CUTOFF1

0326                       33,3351  0 0004 0  MP9TERM1 INHINT
0327  REF   1              33,3352  3 3515 0          CAF     5SECS9
0328  REF 100 LAST 735     33,3353  0 5663 1          TC      WAITLIST
0329  REF 108 LAST 732                 E4             EBANK=  TDEC
0330                       33,3354  03362 0           2CADR   87LMP
C0330 REF   2 LAST  65     33,3355  66064 0
0331  REF  81 LAST 735     33,3356  0 4161 0          TC      PHASCHNG
0332                       33,3357  40572 0           OCT     40572          2,57 FOR 87LMP TASK.

0333  REF  42 LAST 734     33,3360  0 5225 1          TC      POSTJUMP
0334  REF   7 LAST 734     33,3361  60324 1           CADR    SERVEXIT

0335  REF  21 LAST 731     33,3362  0 5073 0  87LMP   TC      2LMP+DT
0336                       33,3363  00127 0           DEC     87             MANUAL THROTTLE - RESET (30 PERCENT.)
0337                       33,3364  00227 0           DEC     151            ENGINE SELECT-DESC ARM-OFF
0338                       33,3365  01750 1           DEC     1000

0339  REF  22 LAST 736     33,3366  0 5073 0          TC      2LMP+DT
0340                       33,3367  00365 1           DEC     245            DPS PQGS NO1 - OFF
0341                       33,3370  00325 0           DEC     213            DPS PQGS NO2 - OFF
0342                       33,3371  00144 0           DEC     100

0343  REF  23 LAST 736     33,3372  0 5073 0          TC      2LMP+DT
0344                       33,3373  00345 0           DEC     229            DPS PQGS ARM NO1 DISABLE
0345                       33,3374  00305 1           DEC     197            DPS PQGS ARM NO2 DISABLE
0346                       33,3375  02570 1           DEC     1400

0347  REF  57 LAST 735     33,3376  0 5270 1          TC      IBNKCALL
0348  REF  10 LAST 723     33,3377  40054 1           CADR    SETMAXDB

0349  REF  45 LAST 734     33,3400  0 5101 1          TC      1LMP+DT
0350                       33,3401  00032 0           DEC     26             RADAR SELF TEST ON
0351                       33,3402  13560 0           DEC     6000

0352  REF   3 LAST 732     33,3403  0 5052 0          TC      2LMP
0353                       33,3404  00033 1           DEC     27             RADAR SELF TEST POWER - OFF
0354                       33,3405  00267 1           DEC     183            LANDING RADAR POWER - OFF

0355  REF   4 LAST 723     33,3406  0 5126 1          TC      MPENTRY        CALL NEXT MISSION ENTRY ROUTINE
0356                       33,3407  00001 0           DEC     1
0357                       33,3410  00013 0           DEC     11
0358  REF   1              33,3411  01752 0           ADRES   MP9-11DT

0359  REF  15 LAST 717     33,3412  0 6067 0          TC      FLAG1DWN       KNOCK DOWN AVERAGEG FLAG
0360                       33,3413  00001 0           OCT     00001

0361  REF  82 LAST 736     33,3414  0 4161 0          TC      PHASCHNG
0362                       33,3415  00002 0           OCT     2
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```
0363   REF  35 LAST 735    33,3416  1 5727 1            TCF    TASKOVER      MISSION PHASE 9 COMPLETE

0364   REF  54 LAST 729    33,3417  0 6112 0  DPS1EQJ1  TC     INTPRET
0365                       33,3420  47375  0  +1        VLOAD  VXV
0366   REF   9 LAST 701    33,3421  01017  0            VN     VN SCALED AT 2(+7)M/CS
0367   REF   2 LAST 700    33,3422  01033  0            UNITR  UNITR IS UNIT VECTOR ALONG RN
0368                       33,3423  63256  0            UNIT   PDVL
0369   REF   3 LAST 737    33,3424  01033  0            UNITR
0370                       33,3425  77635  1            VXV
0371                       33,3426  43325  1            PDDL   DAD
0372   REF   2 LAST 325    33,3427  02355  0            RP     TARGET DISTANCE - PERIGEE OR APOGEE
0373   REF   2 LAST 701    33,3430  01047  0            RMAG   RP AND RMAG SCALED AT 2(+24)M
0374                       33,3431  65205  0            DMP    PDDL
0375   REF   3 LAST 737    33,3432  01047  0            RMAG
0376   REF   3 LAST 737    33,3433  02355  0            RP
0377                       33,3434  56205  0            DMP    DDV
0378   REF   1             33,3435  27514  1            2MJEBTH9  SCALED AT 2(+38)M(3)/CS(2).
0379                       33,3436  74366  1            SQRT   VXSC
0380                       33,3437  77752  1            VSL2
0381   REF   6 LAST 335    33,3440  02324  0            STORE  VDVECT        FOR DWNLK ONLY. SCALED AT 2(+7)M/CS

0382                       33,3441  77651  0            VSU
0383   REF  10 LAST 737    33,3442  01017  0            VN
0384   REF   4 LAST 335    33,3443  02332  1            STORE  VGVECT        FOR DWNLK ONLY. SCALED AT 2(+7)M/CS

0385                       33,3444  77656  1            UNIT                 LEAVES ABVAL IN LV
0386   REF   3 LAST 734    33,3445  02272  1            STORE  UNITVG

0387                       33,3446  77650  1            GOTO
0388   REF   3 LAST 730    33,3447  02262  0                   SHJJMP1

0389   REF  24 LAST 736    33,3450  0 5073 0  228LMP    TC     2LMP+DT
0390                       33,3451  00344  1            DEC    228           DPS PGGS ARM NO1 - ENABLE
0391                       33,3452  00304  0            DEC    196           DPS PGGS ARM NO2 - ENABLE
0392                       33,3453  00144  0            DEC    100

0393   REF  25 LAST 737    33,3454  0 5073 0            TC     2LMP+DT
0394                       33,3455  00364  0            DEC    244           DPS PGGS NO1 - ON
0395                       33,3456  00324  1            DEC    212           DPS PGGS NO2 - ON
0396                       33,3457  01356  0            DEC    750

0397   REF  58 LAST 736    33,3460  0 5270 1            TC     IBNCALL
0398   REF   7 LAST 717    33,3461  40062  1            CADR   JLLAGE         +X TRANSLATION ON.

0399   REF  33 LAST 736    33,3462  0 4161 0            TC     PHASCHNG
0400                       33,3463  00002  0            OCT    2

0401   REF  36 LAST 737    33,3464  1 5727 1            TCF    TASKOVER      END 228LMP TASK

R0402          ***********************************
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```
 0403   REF   1              33,3465   66760 0  EQU2ADR  CADR    DPS1FQU2

 0404   REF   1              33,3466   67265 1  EQU3ADR  CADR    DPS1FQU3

 0405   REF 109 LAST 736                  E4              EBANK=  TDEC
 0406                        33,3467   03417 0  EQU1ADR  2CADR   DPS1FQU1
C0406   REF   2 LAST 729     33,3470   66064 0
 0407   REF 110 LAST 738                  E4              EBANK=  TDEC
 0408                        33,3471   03351 0  MP9TM1AD 2CADR   MP9TFRM1
C0408   REF   1              33,3472   66064 0
 0409   REF 111 LAST 738                  E4              EBANK=  TDEC
 0410                        33,3473   02336 0  RVUPDADR 2CADR   RVUPDATE
C0410   REF   1              33,3474   16064 1
 0411                        33,3475   00000 1  4SECSD9  2DEC    400
C0411                        33,3476   00620 0
 0412                        33,3477   00000 1  66SECSD9 2DEC    6600
C0412                        33,3500   14710 1
 0413                        33,3501   00001 0  5M15S    2DEC    315D8
C0413                        33,3502   35414 0
 0414                        33,3503   00000 1  DPA      2DEC    .09449 B-17      SCALED AT 2(+17)M/CS
C0414                        33,3504   00302 0
 0415                        33,3505   22653 1  DPB      2DEC    .0009874 B+11    SCALED AT 2(-11)M/CS(+2)
C0415                        33,3506   21315 0
 0416                        33,3507   00000 1  DPC      2DEC    2600. B-28       SCALED AT 2(+28)CS
C0416                        33,3510   05050 1
 0418                        33,3511   00000 1  DELTAT9  2DEC    200 E+4 B-35     2SEC/KPIP
C0418                        33,3512   36411 0
 0419                        33,3513   11217 0  2MUERT49 2DEC*   3.98A03223 E+10 B-37*
C0419                        33,3514   27040 0
 0420                        33,3515   00764 1  5SECS9   DEC     500
 0421                        33,3516   11610 0  50SECS9  DEC     5000
 0422                        33,3517   05670 0  30SECS9  DEC     3000
 0423                        33,3520   02114 1  11SECS9  DEC     1100
 0424                        33,3521   15530 0  70SECS9  DEC     7000
R0425          **********************************
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```
 0001                                36,2000          BANK   36
 0002   REF 112 LAST 738                 E4          EBANK= TDEC
 0003   REF   1                      E4,1662  EMP11JOB EQUALS MPRETRN
R0004   MISSION PHASE 11 DOES PROG32-PREDPS2, PROG42-DPS2 BURN BRAKING GUIDANCE,
R0005   PROG43-APPROACH GUIDANCE, PROG63-RANDOM THROTTLE PROGRAM AND PROG74-THE
R0006   FIRE-IN-THE-HOLE AND APS1 BURN

R0007   THE APPROXIMATE STARTING TIME OF THESE PROG IS SHOWN BELOW

R0008   T       PROG32
R0009   T+187   DPS2 IGNITION (TIG11)
R0010   TIG+25  PROG42
R0011   TIG+705 PROG44
R0012   TIG+757 PROG74
R0013   TIG+792 MISSION TERMINATED


 0014   REF  35 LAST 730    36,2000  3 7751 0  MP11J03  CAF    BIT11
 0015   REF   9 LAST 728    36,2001  0 4105 1           TC     SETRSTRT      SET RESTART FLAG

 0016                        36,2002  0 0006 1           EXTEND
 0017   REF  31 LAST 731    36,2003  3 0025 0           DCA    TIME2
 0018   REF  13 LAST 735    36,2004  53,305 1           DXCH   TDECTEMP

 0019   REF  22 LAST 732    36,2005  0 4117 1           TC     NEWMODEX      SET DISPLAY
 0020                        36,2006   00032 0           DCT    32

 0021   REF   1             36,2007  3 2465 1           CAF    1SEC11        SETUP MP11 TASK-REQUIRES 75 SECS AND
 0022                       36,2010  0 0004 0           INHINT               TERMINATES ITSELF
 0023   REF 101 LAST 736    36,2011  0 5663 1           TC     WAITLIST
 0024   REF 113 LAST 739                 E4           EBANK= TDEC
 0025                       36,2012   02545 1           2CADR  MP11TASK
C0025   REF   2 LAST  66    36,2013   74064 0
 0026   REF  32 LAST 735    36,2014  0 4141 1           TC     2PHSCHNG
 0027                       36,2015   40253 1           DCT    40253         3.25SPOT FOR MP11TASK.
 0028                       36,2016   00312 1           DCT    00312         2.31 SPOT TO CONTINUE MP11JOB.

 0029                       36,2017  0 0006 1  11REDO1  EXTEND               SET TDEC TO TIME OF START OF MP 11
 0030   REF  14 LAST 739    36,2020  3 1305 0           DCA    TDECTEMP        PLUS 135 SECONDS.
 0031   REF 114 LAST 739    36,2021  53,567 0           DXCH   TDEC
 0032                       36,2022  0 0006 1           EXTEND
 0033   REF   1             36,2023  3 2517 0           DCA    135SECS
 0034   REF 115 LAST 739    36,2024  21,567 0           DAS    TDEC

 0035                       36,2025  0 0006 1           EXTEND               SET RETURN FROM MIDTOAVE TO INTRTN
 0036   REF   1             36,2026  3 2542 0           DCA    MDAVADR
 0037   REF  24 LAST 733    36,2027  52 006 0           DXCH   Z             DO MIDTOAVE VIA RVUPDATE

 0038   REF  84 LAST 737    36,2030  0 4161 0           TC     PHASCHNG
```

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```
0039                        36,2031  00332 0          DCT     00332

0040                        36,2032  0 0006 1  INTRTN  EXTEND
0041   REF   1              36,2033  3 2534 1          DCA     DPS2ADR      INTEGRATION DONE-DO PRE-DPS2
0042   REF  25 LAST 739     36,2034  52 006 0          DXCH    Z            STATE AT RIGNTION-TIME AT TET FOR PREDPS

R0043   PRE-DPS2 RETURN TO RETPREB WITH ULLAGE-ON TIME AT TULLG. (TIG-7.5).
R0044  THE DESIRED 1/2 UNIT THRUST VECTOR AT POINTVSM.
R0045   STATE VECTOR IN SM COORDINATES STORED AT RN, VN WITH CORRESPONDING
R0046   TIME AT PIPTIME WHERE (TULLG - PIPTIME)IS BETWEEN
R0047   3.8 AND 6 SECS.

0048                        36,2035  0 0004 0  RETPREB  INHINT
0049                        36,2036  0 0006 1           EXTEND
0050   REF   2 LAST  36     36,2037  3 1457 0           DCA     TULLG        C(TULLG)=TIG-7.5
0051   REF 286 LAST 724     36,2040  52 145 0           DXCH    MPAC
0052   REF   1              36,2041  4 2520 0           CS      22.5SECS
0053   REF 146 LAST 732     36,2042  54 001 1           TS      L
0054   REF 231 LAST 733     36,2043  3 7767 0           CAF     ZERO
0055   REF 287 LAST 740     36,2044  54 146 0           TS      MPAC +2
0056   REF 288 LAST 740     36,2045  20 145 0           DAS     MPAC         C(MPAC)=TIG-30
0057                        36,2046  0 0006 1           EXTEND
0058   REF  32 LAST 739     36,2047  4 0025 1           DCS     TIME2        GET CURRENT TIME
0059   REF 289 LAST 740     36,2050  20 145 0           DAS     MPAC         C(MPAC)=DELTA(TIG-30)
0060   REF   8 LAST 708     36,2051  0 7327 0           TC      TPAGREE      MAKE SIGNS AGREE
0061                        36,2052  0 0006 1           EXTEND
0062   REF 290 LAST 740     36,2053  3 0145 1           DCA     MPAC
0063   REF  15 LAST 739     36,2054  53,305 1           DXCH    TDECTEMP
0064   REF 291 LAST 740     36,2055  52 145 0           DXCH    MPAC
0065   REF   5 LAST 731     36,2056  0 5741 0           TC      LONGCALL
0066   REF 116 LAST 739                 E4             EBANK=  TDEC
0067                        36,2057   02120 0           2CADR   TIG11-30
C0067  REF   5 LAST  65     36,2060   74064 0
0068   REF  85 LAST 739     36,2061  0 4161 0           TC      PHASCHNG
0069                        36,2062   20022 0           OCT     20022

0070   REF  55 LAST 737     36,2063  0 6112 0  11REDO2  TC      INTPRET
0071                        36,2064   77775 1           VLOAD
0072   REF   5 LAST 700     36,2065   01011 0                   RN           STATE STORED IN RAVEGON AND VAVEGON FOR
0073   REF   2 LAST  67     36,2066   26115 0           STOVL   RAVEGON      AVERAGE G INITIALIZATION AT PIPTIME
0074   REF  11 LAST 737     36,2067   01017 0                   VN
0075   REF   1              36,2070   16123 0           STODL   VAVEGON
0076   REF   1              36,2071   35646 0                   D1/2         JAM .5,0,0 IN SCAXIS FOR KALCMANU
0077   REF   7 LAST 729     36,2072   15664 1           STODL   SCAXIS
0078   REF   1              36,2073   35273 1                   DZERO
0079   REF   8 LAST 740     36,2074   01666 0           STORE   SCAXIS +2
0080   REF   9 LAST 740     36,2075   15670 1           STODL   SCAXIS +4
0081   REF   3 LAST 735     36,2076   01307 1                   PIPTIME      THIS TIME CONSISTANT WITH STATE-RAVEGON
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```
0082  REF   1                36,2077   02264 0          STORE   DT11TEMP      USED AFTER KALCMANU TO CALL PREREAD
0083                         36,2100   43131 0          SSP     SET
0084  REF  10 LAST 729       36,2101   01653 0                  RATEINDX      SET KALCMANU FOR ANGULAR RATE OF 5 DEG/S
0085                         36,2102   00004 0                  4
0086                         36,2103   01063 0                  33D
0087                         36,2104   77776 1          EXIT

0088  REF   7 LAST 730       36,2105   3 5642 1         CAF     PRIO16        DO ATTITUDE MANEUVER JOB.
0089                         36,2106   0 0004 0         INHINT
0090  REF  23 LAST 732       36,2107   0 5516 0         TC      FINDVAC
0091  REF  22 LAST 730                        E3        EBANK=  MIS
0092                         36,2110     02001 1        2CADR   VECPOINT
C0092 REF   3 LAST 730       36,2111   70063 0
0093  REF 126 LAST 730       36,2112   0 5206 0         TC      BANKCALL
0094  REF   4 LAST 730       36,2113    26743 0         CADR    ATTSTALL      PUT MP11 TO SLEEP - KALCMANU WILL WAKE

0095  REF   5 LAST 730       36,2114   0 4743 0         TC      CURTAINS      KALCMANU HAS GIMBALOC PROBLEMS--CURTAINS
0096  REF  86 LAST 740       36,2115   0 4161 0         TC      PHASCHNG
0097                         36,2116    00352 0         OCT     00352

0098  REF  82 LAST 735       36,2117   0 5567 0         TC      ENDOFJOB      WAIT FOR TIG-30

0099  REF  36 LAST 739       36,2120   3 7751 0 TIG11-30 CAF    BIT11         SEE IF ATTITUDE MANEUVER DONE
0100  REF  16 LAST 730       36,2121   7 0076 1         MASK    FLAGWRD2
0101  REF 289 LAST 730       36,2122   10 000 0         CCS     A
0102  REF   1                36,2123   0 2450 1         TC      DOCURTN       KALCMANU NOT-DO CURTJOB
0103  REF  23 LAST 739       36,2124   0 4117 1         TC      NEWMODEX      SET MODE TO PROG42
0104                         36,2125    00042 1         OCT     42

0105  REF   1                36,2126   3 2530 0         CAF     AVEG11AD      SET UP SERVICER.
0106  REF  14 LAST 733       36,2127   55,310 0         TS      DVSELECT

0107                         36,2130   0 0006 1         EXTEND
0108  REF   1                36,2131   3 2544 0         DCA     ADROFSER
0109  REF  13 LAST 735       36,2132   53,073 0         DXCH    AVGEXIT

0110                         36,2133   0 0006 1         EXTEND
0111  REF   1                36,2134   3 2540 1         DCA     MP11TMAD
0112  REF   7 LAST 733       36,2135   53,075 0         DXCH    DVMNEXIT

0113  REF  15 LAST 680       36,2136   4 0025 1         CS      TIME1
0114  REF   2 LAST 741       36,2137   6 1664 1         AD      DT11TEMP +1   FIND DT TO PIPTIME
0115  REF 230 LAST 741       36,2140   10 000 0         CCS     A             CORRECT NEG DT OR NEGATIVE OVERFLOW DT.
0116  REF 152 LAST 721       36,2141   6 7763 1         AD      ONE
0117                         36,2142   1 2147 0         TCF     +5
0118  REF   1                36,2143   6 6153 0         AD      OCT40001
0119  REF   2 LAST 152       36,2144   6 7771 1         AD      MINJ91        ALLOWS FOR REMOTE CHANCE FO ZERO DT.
0120                         36,2145   4 0000 0         COM
0121                         36,2146   1 2140 1         TCF     -6
0122  REF   3 LAST 733       36,2147   55,342 1         TS      RSDTTEMP      SAVED FOR RESTARTS.
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```
0123   REF 102 LAST 739    36,2150  0 5663 1          TC     WAITLIST
0124   REF   6 LAST 733                 E5            EBANK= DVTOTAL
0125                       36,2151  02000 0           2CADR  PREREAD
C0125  REF   8 LAST 733    36,2152  60065 1
0126   REF  33 LAST 739    36,2153  0 4141 1          TC     2PHSCHNG
0127                       36,2154  40355 0           OCT    40355          5.35 SPOT FOR PREREAD.
0128                       36,2155  00212 0           OCT    00212          2.21 SPOT FOR DPSTART.

0129   REF  59 LAST 737    36,2156  0 5270 1 DPSTART  TC     IBNKCALL
0130   REF   5 LAST 732    36,2157  40277 1           CADR   ENGINOF1

0131   REF  46 LAST 736    36,2160  0 5101 1          TC     1LMP+DT
0132                       36,2161  00226 1           DEC    150            ARM DESCENT ENGINE
0133                       36,2162  01750 1           DEC    1000           DELAY 10 SECONDS

0134   REF  47 LAST 742    36,2163  0 5101 1 TIG11-20 TC     1LMP+DT
0135                       36,2164  00126 1           DEC    86             SET MANUAL THROTTLE TO 10 %
0136                       36,2165  00620 0           DEC    400            DELAY 4 SECONDS

0137   REF  26 LAST 737    36,2166  0 5073 0 TIG11-16 TC     2LMP+DT
0138                       36,2167  00344 1           DEC    228            ENABLE DPS PGGS ARM 1
0139                       36,2170  00304 0           DEC    196            ENABLE DPS PGGS ARM 2
0140                       36,2171  00144 0           DEC    100            DELAY 1 SECOND

0141   REF  27 LAST 742    36,2172  0 5073 0 TIG11-15 TC     2LMP+DT
0142                       36,2173  00364 0           DEC    244            DPS PGGS =1 ON
0143                       36,2174  00324 1           DEC    212            DPS PGGS =2 ON
0144                       36,2175  01356 0           DEC    750            DELAY 7.5 SECONDS

0145   REF  70 LAST 742    36,2176  0 5270 1 TIG-7.5  TC     IBNKCALL
0146   REF   8 LAST 737    36,2177  40062 1           CADR   JLLAGE         CALL FOR 4 JET ULLAGE

0147   REF  55 LAST 735    36,2200  3 7763 1          CAF    BIT1           START UP ABORT STAGE MONITOR.
0148   REF 103 LAST 742    36,2201  0 5663 1          TC     WAITLIST
0149   REF 117 LAST 740                 E4            EBANK= TDEC
0150                       36,2202  02362 1           2CADR  ABMON
C0150  REF   2 LAST  66    36,2203  74064 0
0151   REF  34 LAST 742    36,2204  0 4141 1          TC     2PHSCHNG
0152                       36,2205  40033 0           OCT    40033          3.3 SPOT FOR ABMON
0153                       36,2206  40232 0           OCT    40232          2.23 SPOT FOR TIG11

0154   REF  51 LAST 734    36,2207  0 5701 1          TC     FIXDELAY
0155                       36,2210  01356 0           DEC    750            DELAY 7.5 SECONDS, UNTIL ENGINEON

0156   REF  71 LAST 742    36,2211  0 5270 1 TIG11    TC     IBNKCALL
0157   REF   5 LAST 734    36,2212  40226 0           CADR   DPSENGON

0158   REF  87 LAST 741    36,2213  0 4161 0          TC     PHASCHNG
0159                       36,2214  47012 1           OCT    47012
```

L MISSION PHASE 11 - DPS2/FITH/APS1 USER'S OWN PAGE NO. 5 53 E4

```
0160                                36,2215   00062 0            DEC     50
0161   REF 118 LAST 742                      E4                  EBANK=  TDEC
0162                                36,2216   02222 1            2CADR   TIG11A
C0162  REF   1                      36,2217   74064 0
0163   REF  52 LAST 742             36,2220   0 5701 1           TC      FIXDELAY
0164                                36,2221   00062 0            DEC     50          DELAY HALF A SECOND

0165   REF  72 LAST 742             36,2222   0 5270 1  TIG11A   TC      IBNKCALL
0166   REF   9 LAST 734             36,2223   40066 0            CADR    NOULLAGE

0167   REF  88 LAST 742             36,2224   0 4161 0           TC      PHASCHNG
0168                                36,2225   47012 1            OCT     47012
0169                                36,2226   04766 1            DEC     2550
0170   REF 119 LAST 743                      E4                  EBANK=  TDEC
0171                                36,2227   02233 1            2CADR   TIG11+26
C0171  REF   1                      36,2230   74064 0
0172   REF  53 LAST 743             36,2231   0 5701 1           TC      FIXDELAY
0173                                36,2232   04766 1            DEC     2550        WAIT 25.5 SECONDS

0174   REF  42 LAST 734             36,2233   3 7743 0  TIG11+26 CAF     POSMAX      HAVE BEEN AT 10% THROTTLE FOR 26 SECONDS
0175   REF   4 LAST 734             36,2234   55323 0            TS      PCNTF       NOW CALL FOR MAXIMUM THRUST (92.5%)

0176                                36,2235   0 0006 1           EXTEND
0177   REF   1                      36,2236   3 2536 0           DCA     PCNTFAD
0178   REF  26 LAST 740             36,2237   52 006 0           DXCH    Z

0179                                36,2240   0 0006 1           EXTEND
0180   REF   1                      36,2241   3 2532 1           DCA     BURNADR     STARTING DPS2 GUIDANCE: TIG +26 SECONDS
0181   REF  14 LAST 741             36,2242   53073 0            DXCH    AVGEXIT

0182   REF   3 LAST  88             36,2243   3 1345 1           CA      DAPOFFDT    SKIP AUTOMATIC TURN-OFF OF DAP IF
0183                                36,2244   0 0006 1           EXTEND              DAPOFFDT IS NEGATIVE OR ZERO.
0184   REF   1                      36,2245   6 2253 1           BZMF    NODAPOFF

0185   REF 104 LAST 742             36,2246   0 5663 1           TC      WAITLIST
0186   REF  11 LAST 332                      E7                  EBANK=  DNTMRUFF
0187                                36,2247   02273 0            2CADR   11DAPOFF
C0187  REF   2 LAST  70             36,2250   74067 0
0188   REF  89 LAST 743             36,2251   0 4161 0           TC      PHASCHNG
0189                                36,2252   40116 0            OCT     40116       6.11 FOR 11DAPOFF TASK.

0190   REF  35 LAST 742             36,2253   0 4141 1  NODAPOFF TC      2PHSCHNG
0191                                36,2254   00002 0            OCT     00002
0192                                36,2255   00114 0            OCT     00114       4.11 SPOT FOR THRUSTING

0193   REF  87 LAST 737             36,2256   0 5727 0           TC      TASKOVER

0194                                36,2257   0 0006 1  RETBURN  EXTEND              RETURN FROM BURN GUIDANCE
0195   REF   2 LAST 741             36,2260   3 2544 0           DCA     ADRDFSER    SET SERVICER EXIT TO KILL BURN GUID
0196   REF  15 LAST 743             36,2261   53073 0            DXCH    AVGEXIT
```

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L       MISSION PHASE 11 - DPS2/FITH/APS1                                   USER'S OWN PAGE NO.  6          S3  E4

 0197   REF  30 LAST 743      36,2262  0 4161 0          TC      PHASCHNG
 0198                         36,2263  45022 0           OCT     45022
 0199                         36,2264  20000 0           OCT     20000

 0200   REF  56 LAST 742      36,2265  3 7763 1          CAF     BIT1        SET TASK FOR RANDOM THROTTLE
 0201                         36,2266  0 0004 0          INHINT
 0202   REF 105 LAST 743      36,2267  0 5663 1          TC      WAITLIST    PROGRAM P44
 0203   REF 120 LAST 743                     E4          EBANK=  TDEC
 0204                         36,2270  02300 0           2CADR   PRDT44
C0204   REF   1               36,2271  74064 0
 0205   REF  83 LAST 741      36,2272  1 5567 1          TCF     ENDOFJOB    READACCS STILL ACTIVE.


 0206   REF   8 LAST 691      36,2273  3 5210 1  11DAPOFF CA      PRIO30      CALL JOB TO TURN OFF DAP & START
 0207   REF  23 LAST 722      36,2274  0 5505 1          TC      NOVAC       SPECIAL CDU-ONLY DOWNLINK.
 0208   REF  12 LAST 743                     E7          EBANK=  ONTMRUFF
 0209                         36,2275  02530 0           2CADR   BEGINCDU
C0209   REF   2 LAST 200      36,2276  22067 0
 0210   REF  88 LAST 743      36,2277  1 5727 1          TCF     TASKOVER
```

L MISSION PHASE 11 - DPS2/FITH/APS1 USER'S OWN PAGE NO. 7 S3 E4

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P0211   THE DPS2 RANDOM THROTTLE PROG44 STARTS APPROXIMATELY AT TIG+705. THE
R0212   EXACT TIME AND THRUST LEVEL SETTING AT THE START OF PROG44 ARE COMPUTED
R0213   BY BURN GUIDANCE PROG43.  THE SUBSEQUENT THRUST COMMANDS ARE LISTED.

R0214   T     10 PERCENT THRUST
R0215   T+10  50 PERCENT
R0216   T+30  30 PERCENT
R0217   T+40  20 PERCENT
R0218   T+50  92.5 PERCENT FOR 2 SECS THEN FIRE-IN-THE-HOLE

 0219   REF  24 LAST 741     36,2300  0 4117 1  PROG44    TC      NEWMODEX
 0220                        36,2301   00044 1             OCT     44              SET MODE TO RANDOM THROTTLE

 0221   REF  91 LAST 744     36,2302  0 4161 0             TC      PHASCHNG
 0222                        36,2303   05012 1             OCT     05012
 0223                        36,2304   77777 0             OCT     77777

 0224   REF  22 LAST 696     36,2305  3 7761 0  INDPCT    CAF     FOUR
 0225   REF   4 LAST 741     36,2306  55,342 1             TS      RSDTTEMP        INDEX.

 0226   REF 291 LAST 741     36,2307  50 000 1             INDEX   A               OFFSET POINTER
 0227   REF   1              36,2310  3 2523 1             CAF     20PCTHR         AMOUNT OF THROTTLE
 0228   REF   5 LAST 743     36,2311  55,323 0             TS      PCNTF

 0229                        36,2312  0 0006 1             EXTEND
 0230   REF   2 LAST 743     36,2313  3 2536 0             DCA     PCNTFAD         GO TO THRUSTING ROUTINE
 0231                        36,2314  52 006 0             DTCB

 0232   REF  89 LAST 682     36,2315  4 7762 1             CS      TWO             WATER VALVE DUE 22 SEC AFTER RANDOM
 0233   REF   5 LAST 745     36,2316  6 1342 0             AD      RSDTTEMP        THROTTLE PHASE BEGINS.  THAT PUTS IT
 0234                        36,2317  0 0006 1             EXTEND                  2 SEC AFTER MPRETRN = 2.
 0235   REF   1              36,2320  1 2604 0             BZF     SETWATER

 0236   REF  36 LAST 743     36,2321  0 4141 1             TC      2PHSCHNG
 0237                        36,2322   00114 0             OCT     00114           4.11SPOT FOR THRUSTING
 0238                        36,2323   00372 1             OCT     00372           2.37 FOR MOVENDX TASK.

 0239   REF   6 LAST 745     36,2324  3 1342 0  MOVENDX   CA      RSDTTEMP
 0240   REF   2 LAST 739     36,2325  55,662 0             TS      MPRETRN

 0241   REF  92 LAST 745     36,2326  0 4161 0             TC      PHASCHNG
 0242                        36,2327   40412 1             OCT     40412           2.41 FOR CCSMPRET TASK.

 0243   REF  54 LAST 743     36,2330  0 5701 1             TC      FIXDELAY
 0244                        36,2331   01750 1  10SECS11   DEC     1000            DELAY 10 SECS

 0245   REF   3 LAST 745     36,2332  11,662 0  CCSMPRET  CCS     MPRETRN         DECREMENT INDEX
 0246   REF   1              36,2333  0 2306 0             TC      INDPCT +1       NO

 0247   REF   1              36,2334  3 7743 0             CAF     925PCTHR        TURN ON 92.5 THRUST
```

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```
0248   REF   6 LAST 745    36,2335  55,323 0      TS      PCNTF
0249                       36,2336  0 0006 1      EXTEND
0250   REF   3 LAST 745    36,2337  3 2536 0      DCA     PCNTFAD          GO FOR THRUSTING
0251   REF  27 LAST 743    36,2340  52 006 0      DXCH    Z

0252   REF   2 LAST 739    36,2341  3 2465 1      CAF     1SEC11           THRUST AT MAX FOR 2 SEC, 1 SEC HERE AND
0253   REF 136 LAST 744    36,2342  0 5663 1      TC      WAITLIST         1 MORE IN FITHCMD
0254   REF 121 LAST 744                    E4     EBANK=  TDEC
0255                       36,2343    02354 1     2CADR   FITHCMD
C0255  REF   1             36,2344    74064 0
0256   REF  37 LAST 745    36,2345  0 4141 1      TC      2PHSCHNG
0257                       36,2346    00114 0     DCT     00114            4.11SPOT FOR THRUSTING
0258                       36,2347    47012 1     DCT     47012
0259                       36,2350    00144 0     DEC     100
0260   REF 122 LAST 746                    E4     EBANK=  TDEC
0261                       36,2351    02354 1     2CADR   FITHCMD
C0261  REF   2 LAST 746    36,2352    74064 0
0262   REF  89 LAST 744    36,2353  0 5727 0      TC      TASKOVER
```

L MISSION PHASE 11 - DPS2/FITH/APS1 USER'S OWN PAGE NO. - 9 S3 E4

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P0263  FITH/APS1 PROGRAM 74
R0264  WITH DETECTION OF THE ABORT STAGE DISCRETE BY THE ABORT STAGE MONITOR
R0265  THE FOLLOWING EVENTS OCCUR BY PROGRAM OR ARE PROCESSED AUTOMATICALLY
R0266  BY THE LEM SEQUENCER.

R0267   T-1.0 ABORT STAGE ARM (PROGRAMMED)
R0268   T     ABORT STAGE COMMAND (PROGRAMMED)
R0269         ATTITUDE HOLD (PROGRAMMED)
R0270   T+.04 ASCENT PRESSURIZED
R0271   T+.15 DESCENT ENGINE-OFF
R0272   T+.42 ASCENT ENGINE ARM
R0273         ASCENT/DESCENT STAGING INITIATED
R0274         STAGE VERIFIED
R0275   T+.46 INTERSTAGE BOLTS FIRED
R0276         ASCENT STAGE UMBILICAL ELECTRICAL DEADFACE
R0277   T+.50 DESCENT STAGE UMBILICAL ELEC. DEADFACE
R0278   T+.55 ASCENT/DESCENT STAGE UMBILICAL CUT
R0279   T+.78 ASCENT ENGINE REACHES 90 PC THRUST
R0280  T+1.0 CHANGE LEM MASS (PROGRAMMED)
R0281        DESCENT ENGINE ARM-OFF (PROGRAMMED)
R0282  T+5.0 ASCENT ENGINE-OFF (PROGRAMMED)

 0283  REF  48 LAST 742   36,2354  0 5101 1  FITHCMD  TC     1LMP+DT      THRUST AT MAX FOR 1 MORE SEC AND ABORT
 0284                     36,2355   00046 0            DEC    38
 0285                     36,2356   00144 0            DEC    100          DELAY 1.0 SEC.

 0286  REF   8 LAST 732   36,2357  0 5060 1           TC     1LMP         INITIATE ABORT STAGE COMMAND
 0287                     36,2360   00026 0            DEC    22
 0288  REF  90 LAST 746   36,2361  0 5727 0           TC     TASKOVER     LET ABORT MONITOR TAKE IT FROM HERE

 0289  REF  30 LAST 694   36,2362  3 7762 0  ABMON    CAF    BIT2         ABORT STAGE MONITOR SAMPLES CHANNEL
 0290                     36,2363  0 0006 1           EXTEND              30 FOR ABORT STAGE DISCRETE EVERY .5 SEC
 0291                     36,2364  02 030 0           RAND   30
 0292                     36,2365  0 0006 1           EXTEND
 0293  REF   1            36,2366  1 2374 1           BZF    FITHGCMD     ABORT DISCRETE PRESENT-KILL MONITOR

 0294  REF  16 LAST 741   36,2367  4 0025 1           CS     TIME1
 0295  REF   1            36,2370  55,117 0           TS     TBASE3
 0296  REF  55 LAST 745   36,2371  0 5701 1           TC     FIXDELAY     NO ABORT DISCRETE-CONTINUE TO MONITOR
 0297                     36,2372   00062 0            DEC    50           DELAY .5 SECS
 0298  REF   3 LAST 742   36,2373  1 2362 0           TCF    ABMON

 0299                     36,2374  0 0006 1  FITHGCMD EXTEND              BYPASS GUIDANCE, ASSURE ULLAGE OFF, AND
 0300  REF   3 LAST 743   36,2375  3 2544 0           DCA    ADRESER      CLEAR OUT CURRENT ACTIVITY BY ENEMA - -
 0301  REF  16 LAST 743   36,2376  53,073 0           DXCH   AVGEXIT      ALL THIS TO PROTECT IN CASE OF EARLY
 0302  REF  73 LAST 743   36,2377  0 5270 1           TC     IBNKCALL     ABORT STAGE COMMAND BY GROUND.
 0303  REF  10 LAST 743   36,2400   40066 0           CADR   NOULLAGE

 0304  REF  38 LAST 746   36,2401  0 4141 1           TC     2PHSCHNG
 0305                     36,2402   00001 0            OCT    1
```

L MISSION PHASE 11 - DPS2/FITH/APS1 USER'S OWN PAGE NO. 10 S3 E4

```
0306                          36,2403  00003 1          DCT     3

0307   REF  39 LAST 747       36,2404  0 4141 1         TC      2PHSCHNG
0308                          36,2405  00004 0          DCT     4
0309                          36,2406  00006 1          DCT     6

0310   REF  93 LAST 745       36,2407  0 4161 0         TC      PHASCHNG
0311                          36,2410  00252 1          DCT     00252          2.25 SPOT FOR MP11HOLD.

0312   REF   6 LAST 730       36,2411  3 5660 1         CAF     PRIO37
0313   REF  24 LAST 744       36,2412  0 5505 1         TC      NOVAC
0314   REF  32 LAST 722                      E3         EBANK=  LST1
0315                          36,2413  02354 1          2CADR   ENEMA           ENEMA AS SOON AS POSSIBLE.
C0315  REF   3 LAST 695       36,2414  02063 0
0316   REF  91 LAST 747       36,2415  0 5727 0         TC      TASKOVER

0317   REF  74 LAST 747       36,2416  0 5270 1 MP11HOLD TC     IBNKCALL       ENEMA SHOULD PICK UP HERE.
0318   REF   9 LAST 735       36,2417  40114 1          CADR    STOPRATE       SET ATTITUDE HOLD

0319   REF  25 LAST 745       36,2420  0 4117 1         TC      NEWMODEX       SET MODE TO FIRE-IN-THE-HOLE
0320                          36,2421  00074 1          DCT     74             PROG74

0321   REF   3 LAST 692                      E7         EBANK=  LEMMASS2
0322   REF   2 LAST 692       36,2422  3 5662 0         CAF     EBANK7
0323   REF  49 LAST 708       36,2423  54 003 0         TS      EBANK          SET  EBANK= 7
0324                          36,2424  0 0006 1         EXTEND
0325   REF   4 LAST 748       36,2425  3 1777 1         DCA     LEMMASS2       CHANGE LEM MASS AT DPS/APS SEPARATION
0326   REF   6 LAST 692       36,2426  53 321 1         DXCH    MASS
0327   REF  37 LAST 741       36,2427  3 7751 0         CAF     BIT11          RETURN EBANK TO 04
0328   REF  50 LAST 748       36,2430  54 003 0         TS      EBANK
0329   REF 123 LAST 746                      E4         EBANK=  TDEC

0330   REF  75 LAST 748       36,2431  0 5270 1         TC      IBNKCALL       SET UP DAP FOR APS BURN
0331   REF   3 LAST 693       36,2432  40175 0          CADR    APSENGON

0332   REF  94 LAST 748       36,2433  0 4161 0         TC      PHASCHNG
0333                          36,2434  47012 1          DCT     47012
0334                          36,2435  00144 0          DEC     100
0335   REF 124 LAST 748                      E4         EBANK=  TDEC
0336                          36,2436  02442 1          2CADR   ENGLECT
C0336  REF   1                36,2437  74064 0
0337   REF  56 LAST 747       36,2440  0 5701 1         TC      FIXDELAY
0338                          36,2441  00144 0          DEC     100            DELAY 1 SEC TO DPS ARM OFF

0339   REF  49 LAST 747       36,2442  0 5101 1 ENGLECT  TC     11MP+DT        ENGINE SELECT-DESC ARM OFF
0340                          36,2443  00227 0          DEC     151            APS BURN FOR 5 SECS
0341                          36,2444  00620 0          DEC     400            DELAY 4.0 SECONDS

0342   REF  76 LAST 748       36,2445  0 5270 1         TC      IBNKCALL
0343   REF   8 LAST 735       36,2446  40263 1          CADR    ENGINOFF
```

L MISSION PHASE 11 - DPS2/FITH/APS1 USER'S OWN PAGE NO. 11 S3 E4

```
0344   REF  92 LAST 748     36,2447  0 5727 0            TC     TASKOVER


0345   REF  77 LAST 748     36,2450  0 5270 1  DOCURTN    TC     IBNKCALL     GO SET UP CURTAIN JOB
0346   REF   1              36,2451   57334 1            CADR   CURTJOB

0347   REF   3 LAST 746     36,2452  3 2465 1  MP11TERM   CAF    1SEC11       SET TO DO MP11 TERMINAL TASKS IN 1 SEC
0348                        36,2453  0 0004 0            INHINT
0349   REF 107 LAST 746     36,2454  0 5663 1            TC     WAITLIST
0350   REF 125 LAST 748                    E4            EBANK= TDEC
0351                        36,2455    02463 1           2CADR  MP11OUT
C0351  REF   2 LAST  64     36,2456    74064 0
0352   REF  40 LAST 748     36,2457  0 4141 1            TC     2PHSCHNG
0353                        36,2460    00035 1           OCT    35           5.3 SPOT FOR SERVICER.
0354                        36,2461    40272 1           OCT    40272        2.27 SPOT FOR MP11OUT.

0355   REF  84 LAST 744     36,2462  0 5567 0            TC     ENDOFJOB

0356   REF  50 LAST 748     36,2463  0 5101 1  MP11OUT   TC     1LMP.DT
0357                        36,2464    00047 1           DEC    39           INITIATE ABORT STAGE COMMAND RESET
0358                        36,2465    00144 0  1SEC11    DEC    100          DELAY 1 SEC

0359   REF  51 LAST 749     36,2466  0 5101 1            TC     1LMP.DT
0360                        36,2467    00267 1           DEC    183          LANDING RADAR POWER OFF
0361                        36,2470    01440 0           DEC    800          DELAY 8 SECS

0362   REF  28 LAST 742     36,2471  0 5073 0            TC     2LMP.DT
0363                        36,2472    00365 1           DEC    245          DPS PQGS U AND 2 OFF
0364                        36,2473    00325 0           DEC    213
0365                        36,2474    00144 0           DEC    100          DELAY 1 SEC

0366   REF  29 LAST 749     36,2475  0 5073 0            TC     2LMP.DT
0367                        36,2476    00345 0           DEC    229          DPS PQGS ARM 1 AND 2 DISABLE
0368                        36,2477    00305 1           DEC    197
0369                        36,2500    03554 0           DEC    1900         DELAY 19 SECS TO KILL AVEG

0370   REF  16 LAST 736     36,2501  0 6067 0            TC     FLAGDWN      KILL AVERAGE G
0371                        36,2502    00001 0           OCT    1

0372   REF  78 LAST 749     36,2503  0 5270 1            TC     IBNKCALL
0373   REF  11 LAST 736     36,2504    40054 1           CADR   SETMAXDB

0374   REF  41 LAST 749     36,2505  0 4141 1            TC     2PHSCHNG
0375                        36,2506    00002 0           OCT    2
0376                        36,2507    05013 0           OCT    05013        GROUP 3 FOR MISSION SCHEDULER.
0377                        36,2510    77777 0           OCT    77777

0378   REF   5 LAST 736     36,2511  0 5126 1            TC     MPENTRY      SETUP MISSION PHASE SCHEDULING
0379                        36,2512    00002 0           DEC    2            TIMER -2-
```

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L       MISSION PHASE 11 = D252/F1TH/APS1                    USER'S OWN PAGE NO. 12        S3  E4

0380                          36,2513   00015 0       DEC    13          MISSION PHASE -13-
0381    REF   1               36,2514   01753 1       ADRES  MP11TO13
0382    REF  73 LAST 749      36,2515   0 5727 0      TC     TASKOVER    MISSION PHASE 11 COMPLETE
```

L MISSION PHASE 11 - DPS2/FITH/APS1 USER'S OWN PAGE NO. 13 S3 E4

P0383 ????????????????????????????????
R0384 NUMERICAL AND ADDRESS CONSTANTS
R0385 ????????????????????????????????

A0386 ** TIME CONSTANTS **

```
 0387                          36,2516   00000 1  135SECS  2DEC   13500
C0387                          36,2517   32274 1
 0388                          36,2520   04312 0  22.5SECS 2DEC   2250
 0389                          36,2521   04766 1  25.5SECS 2DEC   2550
 0390                          36,2522   04230 1  22SECS11 2DEC   2200
```

A0391 ** THRUST LEVEL CONSTANTS **

```
 0392                          36,2523   06315 0  20PCTHR  2DEC   .2
 0393                          36,2524   14632 0           2DEC   .4
 0394                          36,2525   11463 0           2DEC   .3
 0395                          36,2526   20000 0           2DEC   .5
 0396                          36,2527   03146 1           2DEC   .1
 0397  REF  43 LAST 743                    7743  92.5PCTHR =      POSMAX      FOR MAXIMUM PERMITTED THRUST (92.5%)
```

A0398 ** ADDRESS CONSTANTS **

```
 0399  REF   4 LAST 719     36,2530   02251 0  AVEG11AD 2ENADR  AVERAGEG
 0400  REF   2 LAST  36                  E4             EBANK=   E2DPS
 0401                       36,2531   02043 1  BURNADR  2CADR   BURN
C0401  REF   1              36,2532   44064 0
 0402  REF   3 LAST 751                  E4             EBANK=   E2DPS
 0403                       36,2533   02000 0  DPS2ADR  2CADR   PREBURN
C0403  REF   1              36,2534   44064 0
 0404  REF  15 LAST 707                  E5             EBANK=   ETHROT      EBANK 5
 0405                       36,2535   03466 0  PCNTFAD  2CADR   PCNTFMAX
C0405  REF   3 LAST 707     36,2536   60065 1
 0406  REF 126 LAST 749                  E4             EBANK=   TDEC
 0407                       36,2537   02452 0  MP11TMAD 2CADR   MP11TERM
C0407  REF   1              36,2540   74064 0
 0408  REF 127 LAST 751                  E4             EBANK=   TDEC
 0409                       36,2541   02336 0  MDAVADR  2CADR   RVUPDATE
C0409  REF   2 LAST 738     36,2542   16064 1
 0410  REF  16 LAST 691                  E5             EBANK=   DVCNTR
 0411                       36,2543   02324 0  ADROFSER 2CADR   SERVEXIT
C0411  REF   8 LAST 736     36,2544   60065 1
```

L MISSION PHASE 11 = DPS2/FITH/APS1 USER'S OWN PAGE NO. 14 S3 E4

P0412 ????????????????????????????????
R0413 TASKS CALLED ELSEWHERE IN MP11
R0414 ????????????????????????????????

```
0415  REF   9 LAST 747    36,2545  0 5060 1  MP11TASK  TC     1LMP
0416                      36,2546  00354 0             DEC    236          DFI T/M CALIBRATION = ON

0417  REF  35 LAST 748    36,2547  0 4161 0            TC     PHASCHNG
0418                      36,2550  40153 1             OCT    40153

0419  REF  57 LAST 748    36,2551  0 5701 1            TC     FIXDELAY
0420                      36,2552  02260 1             DEC    1200

0421  REF   4 LAST 736    36,2553  0 5052 0  NEXLMP    TC     2LMP
0422                      36,2554  00355 1             DEC    237          DFI T/M CALIBRATE = OFF
0423                      36,2555  00306 1             DEC    198          C+W ALARM RESET = COMMAND

0424  REF  36 LAST 752    36,2556  0 4161 0            TC     PHASCHNG
0425                      36,2557  40173 0             OCT    40173

0426  REF  58 LAST 752    36,2560  0 5701 1            TC     FIXDELAY
0427                      36,2561  00310 0  2SECS11     DEC    200

0428  REF  10 LAST 752    36,2562  0 5060 1  NEXLMP1    TC     1LMP
0429                      36,2563  00307 0             DEC    199          C+W ALARM RESET = COMMAND RESET

0430  REF  37 LAST 752    36,2564  0 4161 0            TC     PHASCHNG
0431                      36,2565  40213 0             OCT    40213

0432  REF  59 LAST 752    36,2566  0 5701 1            TC     FIXDELAY
0433                      36,2567  00144 0             DEC    100

0434  REF   5 LAST 752    36,2570  0 5052 0  NEXLMP2    TC     2LMP
0435                      36,2571  00266 0             DEC    182          LR POWER = ON
0436                      36,2572  00032 0             DEC    26           RADAR SELFTEST = ON

0437  REF  38 LAST 752    36,2573  0 4161 0            TC     PHASCHNG
0438                      36,2574  40233 1             OCT    40233

0439  REF  60 LAST 752    36,2575  0 5701 1            TC     FIXDELAY
0440                      36,2576  13560 0             DEC    6000

0441  REF  11 LAST 752    36,2577  0 5060 1  NEXLMP3    TC     1LMP
0442                      36,2600  00033 1             DEC    27           RADAR SELFTEST-OFF

0443  REF  39 LAST 752    36,2601  0 4161 0            TC     PHASCHNG
0444                      36,2602  00003 1             OCT    3
```

L MISSION PHASE 11 - DPS2/FITH/APS1 USER'S OWN PAGE NO. 15 S3 E4

```
0445   REF  94 LAST 750     36,2603  0 5727 0          TC      TASKOVER


0446   REF  42 LAST 749     36,2604  0 4141 1  SETWATER TC      2PHSCHNG
0447                        36,2605  00114 0           OCT     00114          4.11 FOR PCNTJOB JOB.
0448                        36,2606  47012 1           OCT     47012
0449                        36,2607  00310 0           DEC     200
0450   REF 128 LAST 751                    E4          EBANK=  TDEC
0451                        36,2610  02614 0           2CADR   ASWTVLON
C0451  REF   1              36,2611  74064 0
0452   REF  61 LAST 752     36,2612  0 5701 1          TC      FIXDELAY
0453                        36,2613  00310 0           DEC     200

0454   REF  52 LAST 749     36,2614  0 5101 1  ASWTVLON TC      1LMP,DT
0455                        36,2615  00336 1           DEC     222            ASCENT WATER COOLANT VALVE - OPEN
0456                        36,2616  00310 0           DEC     200

0457   REF  53 LAST 753     36,2617  0 5101 1          TC      1LMP,DT
0458                        36,2620  00337 0           DEC     223            ASCENT WATER COOLANT VALVE - OPEN RESET
0459                        36,2621  01130 1           DEC     600

0460   REF   7 LAST 745     36,2622  3 1342 0          CA      RSDTTEMP
0461   REF   4 LAST 745     36,2623  55,662 0          TS      MPRETRN

0462   REF   2 LAST  65     36,2624  1 2332 0          TCF     CCSMPRET
```

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```
R0001   MISSION PHASE 13 EXERCISES THE ASCENT GUIDANCE EQUATIONS OF PROG 46
R0003   THE PREREAD TASK IS SET TO OCCUR IN 140 SECS AT TIG-30 AND AVETOMID DONE
R0004   THE PRE-APS2 PROG 34 IS EXECUTED AND KALCMANU JOB IS STARTED
R0005   THE ENGINEON TASK IS STARTED AT TIG-30 AND IGN IS AT 170 SECS AFTER
R0006   START OF MP13
R0007   THE ASCENT GUIDANCE EQUATIONS START BETWEEN TIG+1 AND +2 SECS
R0008   THE ASC FEED TEST STARTS AT TIG+9 AND TERMINATES 365 SECS LATER

 0009                                  27,3114          BANK    27
 0010   REF 126 LAST 707                  E4           EBANK=  AMEMORY

00105   REF  17 LAST 749   27,3114  0 6067 0  MP13JOB  TC      FLAGIDWN
00107                      27,3115   04000 0           OCT     04000          KNOCK DOWN RESTART FLAG

 0011                      27,3116  0 0006 1           EXTEND
 0012   REF  33 LAST 740   27,3117  3 0025 0           DCA     TIME2          PICK UP CURRENT TIME
 0013   REF 129 LAST 753   27,3120  53'567 0           DXCH    TDEC
 0014   REF  26 LAST 748   27,3121  0 4117 1           TC      NEWMODEX       SET MODE
 0015                      27,3122   00034 0           OCT     34

 0016                      27,3123  22 007 0           ZL                     SET TDEC TO TIME AT TIG-30
 0018   REF   1            27,3124  3 3320 0           CAF     140SECS        TIME TO TIGN-30
 0019   REF 147 LAST 740   27,3125  56 001 0           XCH     L
 0020   REF 130 LAST 754   27,3126  21'567 0           DAS     TDEC           TDEC =TIGN-30 FOR MIDTOAVE

 0021   REF   2 LAST 754   27,3127  3 3320 0           CAF     140SECS
 0022                      27,3130  0 0004 0           INHINT
 0023   REF 108 LAST 749   27,3131  0 5663 1           TC      WAITLIST       SET TASK FOR TIGN-30
00231   REF 131 LAST 754                E4            EBANK=  TDEC
 0024                      27,3132   03175 1           2CADR   TIG13-30
C0024   REF   1            27,3133   56064 0
00242                      27,3134  0 0006 1           EXTEND
00243   REF 132 LAST 754   27,3135  3 1567 1           DCA     TDEC
00244   REF   8 LAST 732   27,3136  53'670 0           DXCH    TIGN
00245                      27,3137  0 0006 1           EXTEND
00246   REF   1            27,3140  3 3317 1           DCA     30SECS13
00247   REF   9 LAST 754   27,3141  21'670 0           DAS     TIGN           DISPLAY TIGN FOR DOWNLINK.

 0025                      27,3142  0 0003 1           RELINT

 0026                      27,3143  0 0006 1           EXTEND
 0027   REF   1            27,3144  3 2441 1           DCA     MIDAVEAD       DO MIDTOAVE COMPUTATION
 0028   REF  28 LAST 746   27,3145  52 006 0           DXCH    Z

 0029                      27,3146  0 0006 1           EXTEND
 0030   REF   1            27,3147  3 3325 0           DCA     PREAP2AD       DO PRE-APS2 TO GET DESIRED ATTITUDE
 0031   REF  29 LAST 754   27,3150  52 006 0           DXCH    Z              STORES VECTORS POINTVSM AND SCAXIS

 0032   REF  56 LAST 740   27,3151  0 6112 0           TC      INTPRET
00321                      27,3152   43131 0           SSP     SET
```

L MISSION PHASE 13 - APS2 USER'S OWN PAGE NO. 2 S3 E4

```
00322  REF  11 LAST 741   27,3153   01653 0                RATEINDX   SET KALCMANU FOR ANGULAR RATE OF 5DEG/S
00323                     27,3154   00004 0                4
00324                     27,3155   01063 0                33D
00325                     27,3156   77776 1          EXIT

00326  REF   8 LAST 741   27,3157   3 5642 1         CAF    PRIO16     SET UP ATTITUDE MANEUVER JOB.
0033                      27,3160   0 0004 0         INHINT
0034   REF  24 LAST 741   27,3161   0 5516 0         TC     FINDVAC
00341  REF  23 LAST 741              E3              EBANK= MIS
0035                      27,3162   02001 1          2CADR  VECPOINT
C0035  REF   4 LAST 741   27,3163   70063 0
0040   REF  57 LAST 744   27,3164   3 7763 1         CAF    BIT1
0041                      27,3165   0 0004 0         INHINT
0042   REF 109 LAST 754   27,3166   0 5663 1         TC     WAITLIST   SET UP DFI T/M CALIBRATE TASK
00421  REF 133 LAST 754              E4              EBANK= TDEC
0043                      27,3167   03341 1          2CADR  DFICAL     DFICAL REQUIRES 14 SECS AND ENDS ITSELF
C0043  REF   1            27,3170   56064 0
00431  REF 127 LAST 741   27,3171   0 5206 0         TC     BANKCALL   PUT MP13 TO SLEEP-KALCMANU WILL WAKE
00432  REF   5 LAST 741   27,3172   26743 0          CADR   ATTSTALL
00433  REF   6 LAST 741   27,3173   0 4743 0         TC     CURTAINS   BAD END RETURN FROM KALCMANU

0045   REF  85 LAST 749   27,3174   0 5567 0         TC     ENDOFJOB   WAIT FOR TIG-30 TASK TO INTERUPT

0046   REF  58 LAST 755   27,3175   3 7763 1  TIG13-30 CAF    BIT1       SET PREREAD FOR NOW
0047   REF 110 LAST 755   27,3176   0 5663 1         TC     WAITLIST
0048   REF   7 LAST 742              E5              EBANK= DVTOTAL
0049                      27,3177   02000 0          2CADR  PREREAD
C0049  REF   9 LAST 742   27,3200   60065 1
00491  REF 100 LAST 752   27,3201   0 4161 0         TC     PHASCHNG   PREREAD RESTART PROTECTION
00492                     27,3202   00335 1          OCT    00335

0050   REF  38 LAST 748   27,3203   3 7751 0         CAF    BIT11      SEE IF ATTITUDE MANEUVER DONE
0051   REF  17 LAST 741   27,3204   7 0076 1         MASK   FLAGWRD2
00511  REF 292 LAST 745   27,3205   10 000 0         CCS    A
0052   REF   2 LAST 749   27,3206   1 3334 1         TCF    CURTJOB    NO-SET UP CURTAINS JOB

00521  REF  27 LAST 754   27,3207   0 4117 1         TC     NEWMODEX
00522                     27,3210   00046 0          OCT    46         SET MODE TO PROG46

0053   REF   1            27,3211   3 3323 0         CAF    AVEG13AD   GENADR OF AVEG IN DVSELECT
0054   REF  15 LAST 741   27,3212   55,310 0         TS     DVSELECT

0063                      27,3213   0 0006 1         EXTEND
0064   REF   1            27,3214   3 3333 1         DCA    SVEX13AD   2CADR SERVEXIT IN AVEGEXIT
0065   REF  17 LAST 747   27,3215   53,073 0         DXCH   AVGEXIT

0066                      27,3216   0 0006 1         EXTEND
0067   REF   1            27,3217   3 3327 1         DCA    MP13TMAD
0068   REF   8 LAST 741   27,3220   53,075 0         DXCH   DVMNEXIT   SET MP RETURN FOR ENGINE SHUT DOWN
```

L MISSION PHASE 13 - APS2 USER'S OWN PAGE NO. 3 S3 E4

```
0069   REF  79 LAST 749    27,3221  0 5270 1          TC     IBNKCALL
006901 REF   6 LAST 742    27,3222    40277 1         CADR   ENGINOF1

00691  REF  54 LAST 753    27,3223  0 5101 1          TC     1LMP.DT
00692                      27,3224    00206 0         DEC    134            ENGINE SELECT-APS ARM
00693                      27,3225    03326 0         DEC    1750           DELAY 17.5 SECS

00694  REF  30 LAST 756    27,3226  0 5270 1          TC     IBNKCALL
00695  REF   9 LAST 742    27,3227    40062 1         CADR   ULLAGE         COMMAND 4 JET ULLAGE-ON

0072   REF  52 LAST 753    27,3230  0 5701 1          TC     FIXDELAY
00721                      27,3231    02342 0         DEC    1250           DELAY 12.5 SECS TO IGNITION

0073   REF  81 LAST 756    27,3232  0 5270 1  TIG13   TC     IBNKCALL
00731  REF   4 LAST 748    27,3233    40175 0         CADR   APSENGON

0074   REF  53 LAST 756    27,3234  0 5701 1          TC     FIXDELAY
0075                       27,3235    00062 0         DEC    50             DELAY .5 SECS

0076   REF  82 LAST 756    27,3236  0 5270 1          TC     IBNKCALL
0077   REF  11 LAST 747    27,3237    40066 0         CADR   NOULLAGE        ULLAGE JETS OFF AT TIG + .5

R00772 NOW THAT THE ENGINE IS ON AND ULLAGE IS OFF, SET UP DUMMY MP 13 & PUT RESTARTABILITY FLAG UP:

00774  REF  43 LAST 753    27,3240  0 4141 1          TC     2PHSCHNG
00775                      27,3241    00313 0         OCT    00313          3.31 SPOT IS DUMMY13 TASK.
007755                     27,3242    00002 0         OCT    2              GROUP 2 OFF.

00776  REF  27 LAST 698    27,3243  3 7747 1          CAF    BIT13
00777  REF  10 LAST 739    27,3244  0 4105 1          TC     SETRSTRT       SET RESTART FLAG

0078   REF  54 LAST 756    27,3245  0 5701 1          TC     FIXDELAY
0079                       27,3246    00372 1         DEC    250            DELAY 2.5 SECS AND START GUIDANCE
0080                       27,3247  0 0006 1          EXTEND
0081   REF   1             27,3250  3 3331 0          DCA    ATMAGAD
0082   REF  18 LAST 755    27,3251    53073 0         DXCH   AVGEXIT        SET AVEG LOOP TO THRUST MAGNITUDE FILTER

0083   REF  55 LAST 756    27,3252  0 5701 1          TC     FIXDELAY
0084                       27,3253    01130 1         DEC    600            START FEED TEST ROUTINE
0085   REF   1             27,3254  0 3353 1          TC     FEEDTEST       START FEED TEST ROUTINE

0086                       27,3255  0 0006 1          EXTEND
0087   REF   1             27,3256  3 3322 1          DCA    342SECS
0088   REF   6 LAST 740    27,3257  0 5741 0          TC     LONGCALL
00881  REF 134 LAST 755                 E4            EBANK= TDEC
0089                       27,3260    03263 0         2CADR  MP13,544
C0089  REF   1             27,3261    56064 0
0090   REF   1             27,3262  1 3264 0  TCGP2OFF TCF    GRP2OFF

0091   REF   1             27,3263  0 3410 1  MP13+544 TC     FEEDRST        DO FEED TEST RESET ROUTINE
```

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```
00912  REF 232 LAST 740     27,3264  4 7767 1  GRP2OFF  CS      ZERO
00914                       27,3265  22 007 0            ZL
00916  REF   2 LAST 102     27,3266  53,102 1            DXCH    -PHASE2

0092   REF  95 LAST 753     27,3267  0 5727 0            TC      TASKOVER        WAIT FOR GUIDANCE TO DO ENGINE OFF

0093   REF  59 LAST 755     27,3270  3 7763 1  MP13TERM  CAF     BIT1            SET MP13 TERMINAL TASKS
0094                        27,3271  0 0004 0            INHINT
0095   REF 111 LAST 755     27,3272  0 5663 1            TC      WAITLIST
00951  REF 135 LAST 756                   E4             EBANK=  TDEC
00952                       27,3273  03277 0             2CADR   MP13OUT
C00952 REF   1              27,3274  56064 0
00953  REF  43 LAST 736     27,3275  0 5225 1            TC      POSTJUMP
009531 REF   9 LAST 751     27,3276  60324 1            CADR    SERVEXIT

0100   REF  83 LAST 756     27,3277  0 5270 1  MP13OUT   TC      IBNKCALL        DEADBAND SELECT = MAX
01001  REF  12 LAST 749     27,3300  40054 1             CADR    SETMAXDB

0101   REF   2 LAST 756     27,3301  0 3410 1            TC      FEEDREST        DO THIS IN CASE OF EARLY ENG SHUT DOWN

0102   REF  56 LAST 756     27,3302  0 5701 1            TC      FIXDELAY
0103                        27,3303  00144 0             DEC     100             DELAY 1 SEC

0104   REF  12 LAST 752     27,3304  0 5060 1            TC      1LMP
0105                        27,3305  00207 1             DEC     135             APS ARM OFF

0109   REF  57 LAST 757     27,3306  0 5701 1            TC      FIXDELAY
0110                        27,3307  05524 1             DEC     2900            DELAY 29 SECS TO KILL AVEG

0111   REF  18 LAST 754     27,3310  0 6067 0            TC      FLAG1DWN        KILL AVE G
01111                       27,3311  00001 0             OCT     1

0112   REF  96 LAST 757     27,3312  0 5727 0            TC      TASKOVER        MISSION PHASE 13 COMPLETE

0114                        27,3313  00144 0  1SEC13     DEC     100
0115                        27,3314  00310 0  2SECS13    DEC     200
0116                        27,3315  02260 1  12SECS13   DEC     1200
01165                       27,3316  00000 1  30SECS13   2DEC    3000
C01165                      27,3317  05670 0
0117                        27,3320  33260 0  140SECS    DEC     14000
0118                        27,3321  00002 0  342SECS    2DEC    34200           342 SECONDS
C0118                       27,3322  02630 0
0120   REF   5 LAST 751     27,3323  02251 0  AVEG13AD   GENADR  AVERAGEG
01201  REF 136 LAST 757                   E4             EBANK=  TDEC
0121                        27,3324  02000 0  PREAP2AD   2CADR   PREAD52
C0121  REF   1              27,3325  64064 1
0122   REF 137 LAST 757                   E4             EBANK=  TDEC
0123                        27,3326  03270 1  MP13TMAD   2CADR   MP13TERM
C0123  REF   1              27,3327  56064 0
01231  REF 138 LAST 757                   E4             EBANK=  TDEC
```

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```
 0124                          27,3330   03005 1  ATMAGAJ  2CADR  ATMAG
C0124   REF   2 LAST 707      27,3331   64064 1
 01241  REF   8 LAST 755             E5            EBANK= DVTOTAL
 01242                        27,3332   02324 0  SVEX13AD 2CADR  SERVEXIT
C01242  REF  10 LAST 757      27,3333   60065 1
```

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```
 0125  REF   7 LAST 748    27,3334  3 5660 1  CURTJOB  CAF     PRIO37          SET UP JOB TO GO TO CURTAINS
 0126  REF  25 LAST 748    27,3335  0 5505 1           TC      NOVAC
 0127  REF   2 LAST 246                   E2           EBANK=  SFAIL
 0128                     27,3336    04743 0           2CADR   CURTAINS
C0128  REF   7 LAST 755    27,3337    04062 1
 0129  REF  37 LAST 757    27,3340  0 5727 0           TC      TASKOVER

 0142  REF  55 LAST 756    27,3341  0 5101 1  DFICAL   TC      1LMP+DT         LMP COMMAND
 0143                     27,3342    00354 0           DEC     236             DFI T/M CALIBRATE - ON
 0144                     27,3343    02260 1           DEC     1200            DELAY 12 SECS

 0145  REF  30 LAST 749    27,3344  0 5073 0           TC      2LMP+DT         LMP COMMANDS
 0146                     27,3345    00355 1           DEC     237             DFI T/M CALIBRATE - OFF
 0147                     27,3346    00306 1           DEC     198             MASTER C+W ALARM RESET - COMMAND
 0148                     27,3347    00310 0           DEC     200             DELAY 2.0 SECONDS

 0149  REF  13 LAST 757    27,3350  0 5060 1           TC      1LMP            LMP COMMAND
 0150                     27,3351    00307 0           DEC     199             MASTER C+W ALARM RESET - COMMAND RESET
 0151  REF  38 LAST 759    27,3352  0 5727 0           TC      TASKOVER        TERMINATE DFI CALIBRATE TASK
```

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```
0152                    27,3353  0 0006 1  FEEDTEST EXTEND
0153  REF   5 LAST 753  27,3354  23'662 1           DXCH    MPRETRN
0154  REF   4 LAST 727  27,3355  0 6060 1           TC      FLAGUP          SET ASC FEED TEST FLAG
0155                    27,3356  00200 0            DCT     200

01551 REF  56 LAST 759  27,3357  0 5101 1           TC      1LMP,DT         TIME T
01552                   27,3360  00176 1            DEC     126             RCS ASCENT FEED VALVE - ARM
01553                   27,3361  00144 0            DEC     100             DELAY 1 SEC

0156  REF  31 LAST 759  27,3362  0 5073 0           TC      2LMP,DT         T+1
0157                    27,3363  00074 1            DEC     60              RCS ASCENT FEED VALVES SYS A-OPEN
0158                    27,3364  00254 1            DEC     172             RCS MAIN S/O VALVES SYS A-CLOSE
0159                    27,3365  00310 0            DEC     200             DELAY FOR 2 SECS

0160  REF  32 LAST 760  27,3366  0 5073 0           TC      2LMP,DT         T+3
0161                    27,3367  00075 0            DEC     61              RCS ASCENT FEED VALVES SYS A-OPEN RESET
0162                    27,3370  00255 0            DEC     173             RCS MAIN S/O VALVES SYS A-CLOSE RESET
0163                    27,3371  01440 0            DEC     800             DELAY FOR 8 SECS

0164  REF  33 LAST 760  27,3372  0 5073 0           TC      2LMP,DT         T+11
0165                    27,3373  00076 0            DEC     62              RCS ASCENT FEED VALVES SYS B-OPEN
0166                    27,3374  00256 0            DEC     174             RCS MAIN S/O VALVES SYS B -CLOSE
0167                    27,3375  00310 0            DEC     200             DELAY FOR 2 SECS

0168  REF  34 LAST 760  27,3376  0 5073 0           TC      2LMP,DT         T+13
0169                    27,3377  00077 1            DEC     63              RCS ASCENT FEED VALVES SYS B-OPEN RESET
0170                    27,3400  00257 1            DEC     175             RCS MAIN S/O VALVES SYS B-CLOSE RESET
0171                    27,3401  01440 0            DEC     800             DELAY 8 SECS

0172  REF  57 LAST 760  27,3402  0 5101 1           TC      1LMP,DT         T+21
0173                    27,3403  00374 1            DEC     252             RCS MANIFOLD CROSSFEED VALVES-OPEN
0174                    27,3404  00310 0            DEC     200             DELAY FOR 2 SECS

0175  REF  14 LAST 759  27,3405  0 5060 1           TC      1LMP            T+23
0176                    27,3406  00375 0            DEC     253             RCS MANIFOLD CROSSFEED VALVES-OPEN RESET

0177  REF   6 LAST 760  27,3407  0 1662 1           TC      MPRETRN
```

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```
0178  REF  18 LAST 755   27,3410  4 0076 1  FEEDREST CS    FLAGWRD2   CHECK FEED TEST FLAG
0179  REF  24 LAST 721   27,3411  7 7754 1        MASK    BIT8
0180  REF 293 LAST 755   27,3412  10 000 0        CCS     A
0181  REF 211 LAST 675   27,3413  0 0002 0        TC      Q          FLAG DOWN-NO RESET

0182                     27,3414  0 0006 1        EXTEND             FLAG UP - DO FEED TEST RESET
0183  REF   7 LAST 760   27,3415  23,662 1        DXCH    MPRETRN

0184  REF   6 LAST 726   27,3416  0 6076 0        TC      FLAG2DWN   FEED TEST FLAG DOWN
01841                    27,3417   00200 0        OCT     200

0185  REF  58 LAST 760   27,3420  0 5101 1        TC      1LMP,DT    TIME T
0186                     27,3421   00376 0        DEC     254        RCS MANIFOLD CROSSFEED VALVES -CLOSE
0187                     27,3422   00144 0        DEC     100        DELAY 1 SEC

0188  REF  35 LAST 760   27,3423  0 5073 0        TC      2LMP,DT    T+1
0189                     27,3424   00274 0        DEC     188        RCS MAIN S/O VALVES SYS A-OPEN
0190                     27,3425   00114 0        DEC     76         RCS ASCENT FEED VALVES SYS A-CLOSE
0191                     27,3426   00144 0        DEC     100        DELAY 1 SECS

0192  REF  59 LAST 761   27,3427  0 5101 1        TC      1LMP,DT    T+2
0193                     27,3430   00377 1        DEC     255        RCS MANIFOLD CROSSFEED VALVES-CLOSE RESE
0194                     27,3431   00144 0        DEC     100        DELAY 1 SEC

0195  REF  36 LAST 761   27,3432  0 5073 0        TC      2LMP,DT    T+3
0196                     27,3433   00275 1        DEC     189        RCS MAIN S/O VALVES SYS A-OPEN RESET
0197                     27,3434   00115 1        DEC     77         RCS ASCENT FEED VALVES SYS A-CLOSE RESET
0198                     27,3435   01440 0        DEC     800        DELAY 8 SECS

0199  REF  37 LAST 761   27,3436  0 5073 0        TC      2LMP,DT    T+11
0200                     27,3437   00276 1        DEC     190        RCS MAIN S/O VALVES SYS B-OPEN
0201                     27,3440   00116 1        DEC     78         RCS ASCENT FEED VALVES SYS B-CLOSE
0202                     27,3441   00144 0        DEC     100        DELAY 1 SEC

02021 REF  50 LAST 761   27,3442  0 5101 1        TC      1LMP,DT    T+12
02022                    27,3443   00177 0        DEC     127        RCS ASCENT FEED VALVE-SAFE
02023                    27,3444   00144 0        DEC     100        DELAY 1 SEC

0203  REF   6 LAST 752   27,3445  0 5052 0        TC      2LMP       T+13
0204                     27,3446   00277 0        DEC     191        RCS MAIN S/O VALVES SYS B-OPEN RESET
0205                     27,3447   00117 0        DEC     79         RCS ASCENT FEED VALVES SYS B-CLOSE RESET

0208  REF   8 LAST 761   27,3450  0 1662 1        TC      MPRETRN    RETURN TO MISSION PROGRAM
```

L MISSION PHASE 13 - APS2 USER'S OWN PAGE NO. 9 S3 E4

```
P0300   COME HERE IF WE GET A RESTART AFTER THE ENGINE IS ON & ULLAGE IS OFF.  SET UP SERVICER SWITCHES TO CAUSE THE
R0310   BURN TO CONTINUE UNTIL PROPELLANT DEPLETION (UNLESS INTERRUPTED BY ENGINE FAILURE OR V74).  EXIT TO POOH AFTER
R0320   SHUTDOWN IS DETECTED.

 0322   REF   6 LAST 735                    E4          EBANK= TTGO

 0325                          27,3451  0 0006 1  DUMMY13  EXTEND
 0330   REF   2 LAST 755       27,3452  3 3333 1          DCA     SVEX13AD
 0335   REF  19 LAST 756       27,3453  53,073 0          DXCH    AVGEXIT

 03355  REF   1                27,3454  3 3262 1          CAF     TCGP2OFF      TO FINISH FEED TEST OR RESET (WHICH ARE
 03356  REF   9 LAST 761       27,3455  55,662 0          TS      MPRETRN           IN GROUP 2)

 0340                          27,3456  0 0006 1          EXTEND
 0345   REF   1                27,3457  3 3474 0          DCA     D13TRMAD
 0350   REF   9 LAST 755       27,3460  53,075 0          DXCH    DVMNEXIT

 0355   REF  19 LAST 757       27,3461  0 6067 0          TC      FLAG1DWN      TO GET SERVICER TO RETURN THRU DVMNEXIT
 0360                          27,3462   00020 0          DCT     00020         WHATEVER CAUSES SHUTDOWN.

 0365   REF   3 LAST 481       27,3463  3 6106 0          CA      PGNSCADR
 0370   REF  16 LAST 755       27,3464  55,310 0          TS      DVSELECT      (SHOULD BE THERE ALREADY.)

 0375   REF  28 LAST 755       27,3465  0 4117 1          TC      NEWMODEX      DISPLAY PROGRAM 47.
 0380                          27,3466   00047 1          DCT     47

 0385   REF  44 LAST 751       27,3467  3 7743 0          CA      POSMAX        DISPLAY LARGE TIME TO GO FOR DOWNLINK.
 0390   REF   7 LAST 762       27,3470  55,745 1          TS      TTGO
 0395   REF   8 LAST 762       27,3471  55,746 1          TS      TTGO +1

 0400   REF  99 LAST 759       27,3472  0 5727 0          TC      TASKOVER

 0402   REF   9 LAST 762                    E4          EBANK= TTGO
 0405                          27,3473   03475 1  D13TRMAD 2CADR   DMY13TRM
C0405   REF   1                27,3474   56064 0

 0410   REF 101 LAST 755       27,3475  0 4161 0  DMY13TRM TC      PHASCHNG
 0415                          27,3476   40333 0          DCT     40333         3.33 IS TRMDMY13 TASK.
 0420                          27,3477  0 0004 0          INHINT
 0425   REF   1                27,3500  3 3521 1          CA      25SEC         INSURE THAT FEED ROUTINES ARE FINISHED.
 0430   REF 112 LAST 757       27,3501  0 5663 1          TC      WAITLIST
 0435   REF  10 LAST 762                      E4          EBANK= TTGO
 0440                          27,3502   03505 1          2CADR   TRMDMY13
C0440   REF   2 LAST  67       27,3503   56064 0
 0445   REF  86 LAST 755       27,3504  0 5567 0          TC      ENDOFJOB

 0450   REF  34 LAST 757       27,3505  0 5270 1  TRMDMY13 TC      IBNKCALL
 0455   REF   9 LAST 748       27,3506   40263 1          CADR    ENGINOFF

 0457   REF  15 LAST 760       27,3507  0 5060 1          TC      ILMP
```

L MISSION PHASE 13 - ADS2 USER'S OWN PAGE NO. 10 S3 E4

```
0458                        27,3510   00207 1          DEC   135          ENGINE SELECT - ASCENT ARM OFF*

04585  REF  44 LAST 756     27,3511   0 4141 1         TC    2PHSCHNG
0459                        27,3512   00003 1          OCT   00003
04594                       27,3513   05012 1          OCT   05012
04596                       27,3514   77777 0          OCT   77777

0460   REF   3 LAST 757     27,3515   0 3410 1         TC    FEEDREST

0465   REF  20 LAST 762     27,3516   0 6067 0         TC    FLAG1DWN     AVERAGE G OFF & EXIT VIA POOH.
0470                        27,3517   00001 0          OCT   00001

0475   REF 100 LAST 762     27,3520   0 5727 0         TC    TASKOVER

0490                        27,3521   04704 0  25SEC   DEC   2500
```

L MISSION PHASE 16 - RCS COLD SOAK USER'S OWN PAGE NO. 1 S3

```
 00001                                  27,3522          BANK   27
  0001   REF  27 LAST 549                   E6          EBANK= EDOT
R000111 PROGRAM DESCRIPTION
R000112 MOD NO= 0                                          LOG SECTION-
R000113 ******** NOTE-     MP16 NOT UP TO DATE ********
R000114                                                    RCS COLD SOAK
R000115 FUNCTIONAL DESCRIPTION-
R000116          CHANGE ATTITUDE OF SPACECRAFT TO REQUIRED
R000117          ATTITUDE FOR COLD SOAK PHASES.
R000118          ISSUE LMP COMMANDS, ETC.
R000119          ACCORDING TO GSOP.
R0002   CALLING SEQUENCE-
R000201          START MP 16 WHEN MISSION TIMER 4
R000202          COUNTS TO ZERO.
R000203 SUBROUTINES CALLED-
R000204          BANKCALL
R000205          DFI T/M CAL. ROUTINE
R000206          EXECUTIVE
R000207          LEM MISSION PROGRAMMER
R000208          KALCMANU
R000209          WAITLIST
R00023  NORMAL EXIT MODES-
R000231          TC    ENDOFJOB/TASKOVER
R000232 ALARM OR ABORT EXIT MODES-   NONE
R000233 OUTPUT- (INTERFACE, DISPLAYS, MEANINGFUL INFORMATIONLEFT IN ERASABLE).
R000234          SAME AS FOR CALCMANU EXCEPT-
R000235          BIT 13 OF DAPBOOLS IS SET TO 1 BEFORE EXIT.
R000236 ERASABLE INITIALIZATION REQUIRED-
R000237          TEPHEM   IN CENTISECONDS TRIPLE PRECISION
R000238 DEBRIS- (ERASABLE LOCATIONS DESTROYED BY THIS PROGRAM)
R000239          SAME AS FOR CALCMANU
R00029  ORIENT THE LEM TO RCS COLD SOAK ATTITUDE
R0003   (S/C X-AXIS NORMAL TO THE ECLIPTIC AND BISECTOR
R0004   OF +Z/-Y AXES TOWARD THE SUN)

R0005   START MISSION PHASE 16 WHEN MP TIMER 4 COUNTS TO ZERO

 0006   REF  29 LAST 762      27,3522  0 4117 1  MP16JOB  TC     NEWMODEX        UPDATE PROGRAM NUMBER
 0007                         27,3523    00016 0          OCT    16              ON DSKY

 0008   REF   3 LAST 722      27,3524  0 2670 1          TC     COLDSOAK        CALCULATE CDU ANGLES REQUIRED
 0009   REF   2 LAST 727      27,3525  3 7746 0          CAF    PRIO6M          SCHEDULE KALCMANU
 0010                         27,3526  0 0004 0          INHINT
 0011   REF  25 LAST 755      27,3527  0 5516 0          TC     FINDVAC
 00115  REF  28 LAST 764                 E6             EBANK= EDOT
 0012                         27,3530    02067 1        2CADR  KALCMAN3
C0012   REF   4 LAST 727      27,3531    70066 0
 0013                         27,3532  0 0003 1          RELINT
 0014   REF   8 LAST 497      27,3533  10 067 1          CCS    NEWJOB          FORCE KALCMANU JOB ON
 0015   REF   7 LAST 497      27,3534  0 5532 0          TC     CHANG1
```

L MISSION PHASE 16 - RCS COLD SOAK USER'S OWN PAGE NO. 2 S3 E6

```
0016  REF 128 LAST 755   27,3535   0 5206 0            TC     BANKCALL        PUT JOB TO SLEEP TILL
0017  REF   6 LAST 755   27,3536    26743 0            CADR   ATTSTALL        MANEUVER COMPLETED
0018                     27,3537   1 3540 1            NOOP                   TC   BADATT-SICK RETURN- ***FIX THIS***

0019  REF   1            27,3540   3 3551 0            CAF    DEC1000         GOOD RETURN--MAN. COMPLETED
0020                     27,3541   0 0004 0            INHINT
0021  REF 113 LAST 762   27,3542   0 5663 1            TC     WAITLIST        WAIT 10 SECONDS
00215 REF  29 LAST 764                 E6              EBANK= EDOT
0022                     27,3543    03552 0            2CADR  PHAS16A
C0022 REF   1            27,3544    56066 1
0023                     27,3545   0 0003 1            RELINT
0024  REF   1            27,3546   3 3550 1            CAF    P16WAKE         PUT THIS JOB
0025  REF  14 LAST 447   27,3547   0 5545 0            TC     JOBSLEEP        TO SLEEP
0026  REF   1            27,3550    57557 1  P16WAKE   CADR   PHAS16B
0027                     27,3551    01750 1  DEC1000   DEC    1000
0028  REF   2 LAST 765   27,3552   3 3550 1  PHAS16A   CAF    P16WAKE         REACTIVATE THE JOB
0029  REF  12 LAST 447   27,3553   0 5551 0            TC     JOBWAKE         THAT WAS PUT TO SLEEP
00294 REF  85 LAST 762   27,3554   0 5270 1            TC     IBNKCALL        DO DFI T/M CALIBRATION ROUTINE
00296 REF   2 LAST 319   27,3555    56204 1            CADR   DFITMCAL

0030  REF 101 LAST 763   27,3556   0 5727 0            TC     TASKOVER

A0034                                  WAIT FOR COMPLETION OF CALIBRATION + 1 SECOND

0035  REF   1            27,3557   3 3606 1  PHAS163   CAF    DEC1300         13 SECONDS
0036                     27,3560   0 0004 0            INHINT
0037  REF 114 LAST 765   27,3561   0 5663 1            TC     WAITLIST
00375 REF  30 LAST 765                 E6              EBANK= EDOT
0038                     27,3562    03565 1            2CADR  P16MXDB
C0038 REF   1            27,3563    56066 1
0040  REF  87 LAST 762   27,3564   0 5567 0            TC     ENDOFJOB
0041  REF  28 LAST 756   27,3565   3 7747 1  P16MXDB   CAF    BIT13           SELECT MAX DEADBAND FOR DAP-
0042  REF  59 LAST 716   27,3566    26 077 0            ADS    DAPBOOLS        SET BIT 13 OF DAPBOOLS =1
0043  REF  16 LAST 762   27,3567   0 5060 1            TC     1LMP            THRUSTER ISOL VALVES PR 3A CLOSE
0044                     27,3570    00136 0            DEC    94
0045  REF  17 LAST 765   27,3571   0 5060 1            TC     1LMP            THRUSTER ISOL VALVES 3B CLOSE
0046                     27,3572    00156 0            DEC    110
0047  REF   1            27,3573   3 3600 1            CAF    DEC200          WAIT 2 SECS
0048  REF 115 LAST 765   27,3574   0 5663 1            TC     WAITLIST
00485 REF  31 LAST 765                 E6              EBANK= EDOT
0049                     27,3575    03601 0            2CADR  P16CLS
C0049 REF   1            27,3576    56066 1
0050  REF 102 LAST 765   27,3577   0 5727 0            TC     TASKOVER
0051                     27,3600    00310 0  DEC200    DEC    200
0052  REF  18 LAST 765   27,3601   0 5060 1  P16CLS    TC     1LMP            THRUSTER ISOL VALVES PR 3A-
0053                     27,3602    00137 1            DEC    95              CLOSE RESET
0054  REF  19 LAST 765   27,3603   0 5060 1            TC     1LMP            THRUSTER ISOL VALVES PR 3B-
0055                     27,3604    00157 1            DEC    111             CLOSE RESET
0056  REF 103 LAST 765   27,3605   0 5727 0            TC     TASKOVER
0058                     27,3606    02424 1  DEC1300   DEC    1300
```

L INTEGRATION INITIALIZATION USER'S OWN PAGE NO. 1 53

```
R000001 AVETOMID PERFORMS THE TRANSITION FROM A THRUSTING PHASE TO A COASTING PHASE.  THE ROUTINE INITIALIZES THE
R000003 ORBITAL INTEGRATION PROGRAM AND RESCALES AND TRANSFORMS LEMS STATE VECTOR FROM THE STABLE MEMBER COORDINATE
R000005 SYSTEM USED IN AVERAGEG TO THE REFERENCE SYSTEM USED IN ORBITAL INTEGRATION DURING COAST
R000008 INPUT - LEM STATE VECTOR IN SM COORDINATE SYSTEM AND TIME
R000009     RN, POSITION IN METERS SCALED AT 2(+24)
R00001      VN, VELOCITY IN M/CSEC SCALED AT 2(+7)
R000011     PIPTIME, TIME IN CSEC CORRESPONDING TO RN, VN
R000012
R000013 OUTPUT - LEM STATE VECTOR IN REF. COORDINATE SYSTEM AND TIME
R000014     RRECT AND RCV, POSITION IN KM SCALED AT 2(+14)
R000015     VRECT AND VCV, VELOCITY IN 1/SQRT(KM) SCALED AT 2(-6)
R000016     TET, TIME IN CSEC
R000017     P-MEMORY (REFRRECT TO REFRRECT + 42)
R000018
R000019 AVETOMID CALLING SEQUENCE
R00002      L-2   EXTEND
R000021     L-1   DCA    (2CADR OF AVETOMID)
R000022     L     DXCH   Z
R000023           DELETE
R000024
R000025 NORMAL EXIT
R000026     AT L+1 OF CALLING SEQUENCE
R000027
 00009                          07,2116          BANK   07
 0001   REF 127 LAST 754                 E4     =BANK= AMEMORY
 0002   REF   1                07,2116  53'631 0 AVETOMID DXCH  AVMIDRTN
 00021  REF  57 LAST 754       07,2117  0 6112 0          TC    INTPRET
 0003                          07,2120  77624 1           CALL                  ORBITAL INTEGRATION INITIALIZATION
 0004   REF   1                07,2121  16324 0                 INITINT
 0009                          07,2122  77775 1           VLOAD
 0010   REF   1                07,2123  16226 0                 ZEROVEC
 0011   REF   1                07,2124  02015 1           STORE TDELTAV         ZERO POS DEVIATIONS
 0012   REF   1                07,2125  02023 1           STORE TNUV            ZERO VEL DEVIATIONS
 0013   REF   1                07,2126  02045 1           STORE TC              ALSO CLEARS TET AND XKEP

 0021                          07,2127  66370 0 SMTOREF   AXT,1  SSP            SET UP TIX LOOP FOR STATE VEC TRANSFORM
 0022                          07,2130  00014 1                  12D
 0023   REF  21 LAST 664       07,2131  00051 0                  S1
 0024                          07,2132  00006 1                  6
 0025                          07,2133  73773 0 SMTOREF1 VLOAD*  VXSC*           TRANSFORM STATE FROM SM TO REF SYSTEM
 0026   REF   6 LAST 740       07,2134  01025 1                  RN +12D,1
 0027   REF   1                07,2135  16250 1                  SCLRAVMD +12D,1
 0028                          07,2136  72505 1           VXM    VSL2
 0029   REF  21 LAST 726       07,2137  01263 1                  REFSMMAT
 0030   REF   1                07,2140  06015 0           STORE  RRECT +12D,1
 0031   REF   1                07,2141  06045 0           STORE  RCV +12D,1

 0032                          07,2142  77500 1           TIX,1  EXIT
 0033   REF   1                07,2143  16133 1                  SMTOREF1
 0034                          07,2144  0 0006 1          EXTEND
```

L INTEGRATION INITIALIZATION USER'S OWN PAGE NO. 2 S3 E4

```
0035   REF   4 LAST 740    07,2145  3 1307 1            DCA    PIPTIME      SAVE PIPTIME
0036   REF   2 LAST 295    07,2146  53'447 0            DXCH   TET          PIPTIME UN TET

00361  REF   1             07,2147  0 2276 0            TC     MOVETEMP     TRANSFER STATE AND INIT. DATA TO E-MEM
0037   REF   2 LAST 766    07,2150  53'631 0            DXCH   AVMINRTN
00371  REF  30 LAST 754    07,2151  52 006 0            DXCH   Z
0038                        07,2152   02400 1 PIPEBANK  DCT    02400        EBANK 05
0042                        07,2153   77776 1 TESTLOOP  EXIT                 FOR DUMP.

0043   REF  58 LAST 766    07,2154  0 6112 0            TC     INITPRET

0044                        07,2155   40145 0            DLOAD  BDV
0045   REF 139 LAST 757     07,2156   02167 0                   TDEC
0046                        07,2157   16160 1                   +1           CLEAR OVERFLOW INDICATOR
0047                        07,2160   47025 0            DSU    RTB
0048   REF   3 LAST 767    07,2161   02047 0                   TET
0049   REF  10 LAST 735     07,2162   33520 0                   SGNAGREE
0050                        07,2163   56261 1            SL     DDV
0051                        07,2164   20214 1                   11D
0052   REF   1              07,2165   17755 0                   EARTHTAB +9D
0053   REF   1              07,2166   02163 1            STORE  DT/2
0054                        07,2167   51400 1            BDV    ABS
0055   REF   1              07,2170   16206 1                   GETMAXDT
0056                        07,2171   50025 0            DSU    BMN
0057   REF   1              07,2172   16236 1                   DT/2MIN
0058   REF   1              07,2173   16354 1                   DECISION     INTEGRATION FINISHED-DECIDE WHERE TO GO
0059                        07,2174   45215 0            DAD    DSU
0060   REF   2 LAST 767    07,2175   16236 1                   DT/2MIN
0061   REF   1              07,2176   16244 1                   DT/2MAX
0062                        07,2177   77640 0            BMN
0063   REF   1              07,2200   17450 0                   TIMESTEP
0064                        07,2201   75345 1 JSEMAXDT  DLOAD  SIGN
0065   REF   2 LAST 767     07,2202   16244 1                   DT/2MAX
0066   REF   2 LAST 767     07,2203   02163 1                   DT/2
0067   REF   3 LAST 767     07,2204   36163 0            STCALL DT/2
0068   REF   2 LAST 767     07,2205   17450 0                   TIMESTEP
0069                        07,2206   77634 0 GETMAXDT  RTB
00695  REF  15 LAST 664     07,2207   73501 1                   SIGNMPAC
0070   REF   4 LAST 767     07,2210   36163 0            STCALL DT/2
00705  REF   1              07,2211   16201 0                   JSEMAXDT



0071                        07,2212   00016 0 SCALER    DEC    14
0072                        07,2213   00004 0 SCALDELT  DEC    4
0073                        07,2214   00022 1 SCALEDT   DEC    18
00731                       07,2215   00000 1 28SECS    2DEC   2800
C00731                      07,2216   05360 1
007311                      07,2217   00001 0 270SECS   2DEC   27000
C007311                     07,2220   24570 0
```

L INTEGRATION INITIALIZATION USER'S OWN PAGE NO. 3 S3 E4

```
 00732                  07,2221  00000 1  2SECS     2DEC   200
C00732                  07,2222  00310 0
  0074                  07,2223  00000 1  30SECS    2DEC   3000          USED ONLY FOR LOGIC IN IGN,28 # 206 ONLY
C0074                   07,2224  05670 0
  0079                  07,2225  00000 1  ZEROVEC   2DEC   0
C0079                   07,2226  00000 1
  0080                  07,2227  00000 1           2DEC   0
C0080                   07,2230  00000 1
  0081                  07,2231  00000 1           2DEC   0
C0081                   07,2232  00000 1
R00811  THE ORDER OF THE SIX FOLLOWING CONSTANTS CANNOT BE CHANGED

  0082                  07,2233  20304 1  SCLRAVMD  2DEC   .512          METERS TO KM  1/2(1024/1000)
C0082                   07,2234  23351 1
  0083                  07,2235  00000 1  DT/2MIN   2DEC   .00053
C0083                   07,2236  17565 1
  0084                  07,2237  37200 1  SCLRMDAV  2DEC   1000 B-10      KM TO METERS
C0084                   07,2240  00000 1
  0085                  07,2241  24605 1  SCLVAVMD  2DEC   .64876819      METERS/CSEC TO 1/SQR(KM)
C0085                   07,2242  15301 1
  0086                  07,2243  12317 1  DT/2MAX   2DEC   .65037077 B-1  270 SEC MAX TIME STEP
C0086                   07,2244  00451 1
  0087                  07,2245  30523 0  SCLVMDAV  2DEC   .7706913       1/SQR(KM) TO METERS/CSEC
C0087                   07,2246  00147 0
```

L INTEGRATION INITIALIZATION USER'S OWN PAGE NO. 4 S3 E4

```
R0100   STATEINT IS CALLED UP UNDER A JOB EVERY 539 SECONDS DURING A COASTING  PHASE BY THE MISSION SCHEDULING
R0102   MAINTENANCE ROUTINE TO MAINTAIN THE LEMS STATE VECTOR WITHIN TWO INTEGRATION STEPS (540 SECONDS) OF THE CURRENT
R0104   TIME (TIME2).  THE ROUTINE COMPARES TIME2 WITH TET (THAT TIME CORRESPONDING TO THE STATE VECTOR IN STORAGE).
R0106   IF TET LAGS BY 270 SECONDS OR MORE, THE ORBITAL INTEGRATION PROGRAM IS  CALLED UP AND THE STATE IS UPDATED TO
R0108   TIME2.  IF TET DOES NOT LAG, STATEINT IS TERMINATED BY ENDOFJOB.
R0109
R0110   INPUT-STATEINT ASSUMES THAT THE COASTING IN PROGRESS WAS INITIALIZED BY
R0111      THE AVETOMID ROUTINE.
R0112
 0113                          07,2247  0 0006 1  STATEINT EXTEND
 0114   REF  34 LAST 754       07,2250  3 0025 0            DCA     TIME2          GET CURRENT TIME IN TDEC
 01141  REF 140 LAST 767       07,2251  53'567 0            DXCH    TDEC
 011411 REF   5 LAST 760       07,2252  0 6060 1            TC      FLAG2UP        SET ORBITAL INTEGRATION FLAG
 011412                        07,2253   00100 0            DCT     100
 01142  REF   1                07,2254  0 2311 0            TC      MOVEPERM       BRING STATE FROM PMEMORY
 0115   REF  59 LAST 767       07,2255  0 6112 0            TC      INTPRET

 0116                          07,2256   45345 1            DLOAD   DSU            FORM TDEC-TET
 0117   REF 141 LAST 769       07,2257   02167 0                    TDEC
 0118   REF   4 LAST 767       07,2260   02047 0                    TET
 0119                          07,2261   45240 0            BMN     DSU            IS STATE LAGGING
 0120   REF   1                07,2262   16274 1                    NOINT          NO, TET GREATER THAN TDEC
 0121   REF   1                07,2263   16220 0                    270SECS
 0122                          07,2264   66240 1            BMN     SSP
 0123   REF   2 LAST 769       07,2265   16274 1                    NOINT          NO, TET GREATER THAN TDEC-270 SECS.
 0124   REF   2 LAST 301       07,2266   02201 0                    MEASMODE       BRING TO CURRENT TIME-SET MEASMODE (-1)
 0125                          07,2267   77776 1            DEC     -1
 01251                         07,2270   77624 1            CALL
 01252  REF   2 LAST 766       07,2271   16324 0                    INITINT        INITIALIZE BRANCH REGS
 0126                          07,2272   77650 1            GOTO
 0127   REF   1                07,2273   16153 1                    TESTLOOP       START INTEGRATION FROM TET TO TDEC
 0128                          07,2274   77776 1  NOINT     EXIT                   TEMPORARY STATEINT EXIT
 0129   REF   1                07,2275  1 2544 1            TCF     INTOUT         NO INTEGRATION, TERMINATE THIS JOB
```

L INTEGRATION INITIALIZATION USER'S OWN PAGE NO. 5 S3 E4

```
R0200   MOVETEMP TRANSFERS RRECT TO RRECT +42 FROM A-MEMORY TO P-MEMORY
R0201
R0202   CALLING SEQUENCE
R0203       L    TC    MOVETEMP
R0204
R0205   NORMAL EXIT AT L+1
 0206                        07,2276  0 0006 1  MOVETEMP EXTEND
02061   REF    2 LAST  40   07,2277  23'627 0           DXCH    PBODY       TEMP, HERE-PBODY INITIALIZED BEFORE INT
02065   REF    1            07,2300  3 2370 1           CAF     FORTYTWO
 0207   REF    1            07,2301  55'605 1  MTEMPLJP TS      DIFFCNT     INITIALIZE INDEX
 0208   REF    2 LAST 770   07,2302  51'605 0           INDEX   DIFFCNT
 0209   REF    2 LAST 766   07,2303  3 1400 1           CA      RRECT       PICK UP RRECT TO RRECT +42 FROM A-MEMORY
 0210   REF    3 LAST 770   07,2304  51'605 0           INDEX   DIFFCNT
 0211   REF    4 LAST 323   07,2305  55'210 1           TS      REFRRECT    STORE IN REFRRECT TO REFRRECT +42 IN P-M
 0212   REF    4 LAST 770   07,2306  11'605 1           CCS     DIFFCNT     IS TRANSFER COMPLETE
 0213   REF    1            07,2307  1 2301 0           TCF     MTEMPLUP    NO --- LOOP AGAIN.
 0214   REF    3 LAST 770   07,2310  0 1627 0           TC      PBODY

R02142  MOVEPERM TRANSFERS REFRRECT TO REFRRECT +42 FROM PMEMORY TO A-MEMORY
R0215
 0216                        07,2311  0 0006 1  MOVEPERM EXTEND
02161   REF    4 LAST 770   07,2312  23'627 0           DXCH    PBODY       TEMP, HERE-PBODY INIT, BEFORE INTEGRATIO
02165   REF    2 LAST 770   07,2313  3 2370 1           CAF     FORTYTWO
 0217   REF    5 LAST 770   07,2314  55'605 1  MPERMLJP TS      DIFFCNT
 0218   REF    6 LAST 770   07,2315  51'605 0           INDEX   DIFFCNT
 0219   REF    5 LAST 770   07,2316  3 1210 0           CA      REFRRECT
 0220   REF    7 LAST 770   07,2317  51'605 0           INDEX   DIFFQCNT
 0221   REF    3 LAST 770   07,2320  55'400 0           TS      RRECT
 0222   REF    8 LAST 770   07,2321  11'605 1           CCS     DIFFCNT
 0223   REF    1            07,2322  1 2314 1           TCF     MPERMLUP
 0224   REF    5 LAST 770   07,2323  0 1627 0           TC      PBODY

 02241                       07,2324  66331 0  INITINT  SSP     SSP
 02242  REF    6 LAST 770   07,2325  02230 1           PBODY   EARTHTAB INTO PBOAY
 02243  REF    2 LAST 767   07,2326  17743 1           EARTHTAB
 02244  REF    1            07,2327  02205 1           STEPEXIT TESTLOOP INTO STEPEXIT
 02245  REF    2 LAST 769   07,2330  16153 1           TESTLOOP
 02246                       07,2331  43014 0           CLEAR   CLEAR
022461  REF    1            07,2332  00262 1           MIDFLAG ZERO ON 206
022462  REF    1            07,2333  00263 0           MODEFLAG ZERO ON 206
 02247                       07,2334  43414 1           CLEAR   RVQ
022471  REF    1            07,2335  00260 0           WMATFLAG W-MATRIX NOT USED ON 206
```

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P0225   MIDTOAVE PERFORMS THE STATE VECTOR TRANSITION FROM A COASTING PHASE
R0226   USING THE ORBITAL INTEGRATION PROGRAMS TO A TRUSTING PHASE WHICH USES
R0227   AVERAGED INTEGRATION.  THE ROUTINE RESCALES AND TRANSFORMS THE STATE
R0228   VECTORS AT TIGN-30, TIGN-2 AND TIGN FROM REFERENCE COORDINATES TO
R0229   STABLE MEMBER COORDINATES AS DIRECTED BY THE DECISION ROUTINE
R0230
R0231   INPUT-MIDTOAVE ASSUMES THAT THE COASTING INTEGRATION WAS INITIALIZED
R0232      BY THE AVETOMID ROUTINE.  STATE IN REF. COORD. IN PMEMORY.
R0233
R0234      RREC, RCV-POSITION IN KM SCALED AT 2(+14)
R0235      VREC, VCV- VELOCITY IN 1/SQRT(KM) SCALED AT 2(-6)
R0236      TET, TIME IN CSECS.
R0237
R0238   OUTPUT-STATE IN STABLE MEMBER COORDINATES
R0239   AT TIGN-30
R0240      RAVEGON, POSITION IN METERS SCALED IN 2(+24)
R0241      VAVEGON, VELOCITY IN METERS/CSEC SCALED AT 2(+7)
R0242
R0243   AT TIGN-2
R0244      RIG=2SEC, POSITION IN METERS SCALED AT 2(+24)
R0245
R0246   AT TIGN
R0247
R0248      RIGNTION, POSITION IN METERS SCALED AT 2(+24)
R0249      VIGNTION, VELOCITY IN METERS/CSEC SCALED AT 2(+7)
R0250
R0251   CALLING SEQUENCE
R0252      (COMPUTE TDEC=TIME OF IGNITION-30 SECS.)
R0253      L-2    EXTEND
R0254      L-1    DCA     (2CADR OF MIDTOAVE)
R02541     L      DXCH    Z
R0255
R0256   NORMAL EXIT
R0257      L+1 OF CALLING SEQUENCE
R0258
 02581  REF   3 LAST 767     07,2336   53'631 0  RVUPDATE DXCH   AVMIDRTN
 02582  REF  50 LAST 757     07,2337   3 7763 1            CAF    BIT1          SET MEASMODE TO +1 TO INTEGRATE STATE
 02583  REF   4 LAST 719     07,2340   1 2343 0            TCF    MIDTOAVE +2   TO TDEC AND STORED IN RIGNTION ONLY

 0259   REF   4 LAST 771     07,2341   53'631 0  MIDTOAVE DXCH   AVMIDRTN
 02591  REF   6 LAST 421     07,2342   3 7770 0            CA     NEG0
 0260   REF   3 LAST 769     07,2343   55'600 1            TS     MEASMODE      SET MEASMODE (-0) TO INTEGRATE TO IG-30
 02601  REF   6 LAST 769     07,2344   0 6060 1            TC     FLAGSUP       SET ORBITAL INTEGRATION FLAG
 02602                        07,2345    00100 0           DCT    100
 0261   REF   2 LAST 769     07,2346   0 2311 0            TC     MOVEPERM      BRING STATE FROM PMEMORY
 0262   REF  70 LAST 769     07,2347   0 6112 0            TC     INTPRET
 02621                        07,2350    77624 1           CALL                 INITIALIZE ORBITAL INTEGRATION REGS
 02622  REF   3 LAST 769     07,2351    16324 0                  INITINT
 0263                         07,2352    77650 1           GOTO
 0264   REF   3 LAST 770     07,2353    16153 1                  TESTLOOP      GO TO ORBITAL INTEGRATION
```

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R0265   THE DECISION ROUTINE DETERMINES THE ACTION TO BE TAKEN AFTER ORBITAL
R0266   INTEGRATION HAS UPDATED THE STATE VECTOR TO THE TIME INDICATED
R0267   BY TDEC.  THE ACTION TAKEN IS BASED ON THE CONTENTS OF MEASMODE.
R0268
R0269   C(MEASMODE)=(-0), STATE INTEGRATED (REF. COORD.) TO TIGN-30, SET
R0270           MEASMODE=(+0), SET TDEC=TIGN-2SECS.
R0271   C(MEASMODE)=(+0), POSITION VECTOR INTEGRATED TO TIGN-2, SET MEASMODE=,+1
R0272           SET TDEC=TIGN
R0273   C(MEASMODE)=(+1), STATE INTEGRATED TO TIGN, TRANSFORM STATE FROM REF TO
R0274           SM COORD. SYSTEM AND RETURN TO MISSION PROGRAM
R0275   C(MEASMODE)=(-1), STATE INTEGRATED TO TDEC DURING COAST PHASE, TERMINATE
R0276           STATEINT JOB INITIATED BY MISSION SCHEDULING PACKAGE
R0277
 0278                        07,2354   77776 1  DECISION EXIT
 0279   REF   4 LAST 771     07,2355  11'600 1           CCS    MEASMODE
 0280                        07,2356  1 2361 0           TCF    +3              STATE IN REF COOR AT IGN
 0281                        07,2357  1 2361 0           TCF    +2              STATE IN REF COORD AT IGN-2
 0282   REF   1              07,2360  1 2471 0           TCF    COASTINT        COAST INTEGRATION STEP COMPLETE
 0283   REF  71 LAST 771     07,2361  0 6112 0           TC     INTPRET
02831                        07,2362   77624 1           CALL
02832   REF   1              07,2363   17500 1                  RECTIFY         RECTIFY AT IGN-30,IGN-2,IGN

02833                        07,2364   77776 1           EXIT
 0284   REF   5 LAST 772     07,2365  11'600 1           CCS    MEASMODE
 0285   REF   1              07,2366  1 2445 1           TCF    REFTOSM         STATE AT TIGN-FINISH UP MIDTOAVE
 0286   REF   1              07,2367  1 2421 0           TCF    TIGN-2SEC       POS AT TIGN-2, DO TIGN NEXT
 0287                        07,2370   00051 0  FORTYTWO  DEC    41
 0288   REF   1              07,2371  1 2372 1           TCF    AVEGON          STATE AT TIGN-30, DO TIGN-2 NEXT

 0289   REF  72 LAST 772     07,2372  0 6112 0  AVEGON   TC     INTPRET
 0290                        07,2373   66370 0           AXT,1  SSP             SET LOOP
 0291                        07,2374   00014 1                  12D
 0292   REF  22 LAST 766     07,2375   00051 0                  S1
 0293                        07,2376   00006 1                  6
 0294                        07,2377   73773 0  SPECPLS1 VLOAD* VXSC*
02941   REF   4 LAST 770     07,2400   02015 1                  RRECT +12D,1
02942   REF   1              07,2401   16254 0                  SCLRMDAV +12D,1  REF TO SM SCALE FACTOR
02943                        07,2402   76521 0           MXV    VSL1
02944   REF  22 LAST 766     07,2403   01263 1                  REFSMMAT
02945   REF   3 LAST 740     07,2404   06131 1           STORE  RAVEGON +12D,1
02946                        07,2405   71300 1           TIX,1  DLOAD
02947   REF   1              07,2406   16377 0                  SPECPLS1
 0295   REF 142 LAST 769     07,2407   02167 0                  TDEC            TDEC NOW=TIGN-30
02951   REF   5 LAST 767     07,2410   01307 1           STORE  PIPTIME         SAVE TIGN-30 IN PIPTIME FOR AVERAGEG
02952   REF   3 LAST 675     07,2411   02111 1           STORE  TAVEGON         TIME TIG-30 FOR DWNLINK IN NORMIZE
 0296                        07,2412   77615 0           DAD
 0297   REF   1              07,2413   16216 0                  28SECS          TDEC + 28SECS
 0298   REF 143 LAST 772     07,2414   02167 0           STORE  TDEC            TDEC SET TIGN-2
 0299                        07,2415   52131 0           SSP    GOTO
 0300   REF   6 LAST 772     07,2416   02201 0                  MEASMODE        SET MEASMODE=(+0)
```

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```
0301                              07,2417   00000 1                    0
0302    REF   4 LAST 771          07,2420   16153 1                    TESTLOOP        GO INTEGRATE STATE TO IGN-2

03021   REF  73 LAST 772          07,2421   0 6112 0  IGN-2SEC  TC     INTPRET
0303                              07,2422   74375 0           VLOAD    VXSC            TRANSFORM POS AT IGN-2 FROM REF TO SM
0304    REF   5 LAST 772          07,2423   02001 1                    RRECT
0305    REF   2 LAST 772          07,2424   16240 0                    SCLRMDAV
0306                              07,2425   76521 0           MXV      VSL1
0307    REF  23 LAST 772          07,2426   01263 1                    REFSMMAT
0308    REF   1                   07,2427   16131 0           STODL    RIG-2SEC        POS IN SM COORD. AT IGN-2
0309    REF 144 LAST 772          07,2430   02167 0                    TDEC
0310                              07,2431   43214 1           BONCLR   DAD
03101   REF   2 LAST 700          07,2432   02212 1                    INTEGRSW        IF SET, FINAL TESTLOOP GIVES IGN+28 STAT
03102   REF   1                   07,2433   16442 1                    IGN+28          INSTEAD OF IGN STATE - FOR MP 4 ONLY.
0311    REF   1                   07,2434   16222 1                    2SECS
0312    REF 145 LAST 773          07,2435   02167 0  TDECSTOR STORE    TDEC
0313                              07,2436   52131 0           SSP      GOTO
0314    REF   7 LAST 772          07,2437   02201 0                    MEASMODE        SET MEASMODE=(+1)
0315                              07,2440   00001 0                    1
03155   REF   5 LAST 773          07,2441   16153 1                    TESTLOOP        GO INTEGRATE STATE TO IGN OR IGN+28

03156                             07,2442   52015 1  IGN+28   DAD      GOTO
03157   REF   1                   07,2443   16224 1                    BOSFCS          FOR MP4.  REMOVE AFTER FLIGHT 206.
0316    REF   1                   07,2444   16435 1                    TDECSTOR

031601  REF   7 LAST 761          07,2445   0 6076 0  REFTOSM  TC     FLAG2DWN        REMOVE ORBITAL INTEGRATION GLAG
031602                            07,2446   00100 0           DCT      100
03161   REF  74 LAST 773          07,2447   0 6112 0          TC       INTPRET
0317                              07,2450   66370 0           AXT,1    SSP             SET UP TIX LOOP
0318                              07,2451   00014 1                    12D             12 IN X1
0319    REF  23 LAST 772          07,2452   00051 0                    S1              6 IN S1
0320                              07,2453   00006 1                    6
0321                              07,2454   73773 0  REFTOSM1 VLOAD*   VXSC*           TRANSFORM STATE AT TIGN FROM REF TO SM
0322    REF   6 LAST 773          07,2455   02015 1                    RRECT +12D,1
0323    REF   3 LAST 773          07,2456   16254 0                    SCLRMDAV +12D,1 REF TO SM SCALE FACTOR
0324                              07,2457   76521 0           MXV      VSL1
0325    REF  24 LAST 773          07,2460   01263 1                    REFSMMAT
0326    REF   1                   07,2461   06015 0           STORE    RIGNTION +12D,1   STATE AT TIGN IN SM COORDINATES
0333                              07,2462   77500 1           TIX,1    EXIT
0334    REF   1                   07,2463   16454 0                    REFTOSM1
03341                             07,2464   0 0006 1          EXTEND                   PLAY SAFE WITH BASIC**********************
033415  REF   5 LAST 769          07,2465   3 1447 1          DCA      TET             **********************************************
03342   REF   1                   07,2466   53,777 0          DXCH     TIGNTION        STATE TIME FOR DOWNLINK IN VPATCHER
0335    REF   5 LAST 771          07,2467   53,631 0          DXCH     AVMIDRTN
03351   REF  31 LAST 767          07,2470   52 006 0          DXCH     Z
R0336   THE COASTINT ROUTINE TERMINATES THE ORBITAL INTEGRATION JOB SET BY
R03361  MISSION SCHEDULING ROUTINE EVERY 539 SECONDS DURING COASTING PHASES.
R03362  THE ROUTINE TRANSFERS THE STATE VECTOR AND ALL OTHER ORBITAL INTEGRATION
R03363  QUANTITIES TO P-MEMORY.  IT FORMS A TOTAL STATE VECTOR AND TRANSFORMS IT
R03364  TO STABLE MEMBER COORDINATES AND STORES IT WITH TIME IN RN, VN AND
```

L INTEGRATION INITIALIZATION USER'S OWN PAGE NO. 9 S3 E4

R0337 STATIME FOR DOWNLINK. THE ROUTINE THEN REMOVES THE INTEGRATION FLAG
R0338 TO ALLOW GROUND UPDATE OF THE STATE VECTOR AND DOES ENDOFJOB.
R0339

```
03391  REF 102 LAST 762    07,2471  0 4161 0  CSASTINT TC      PHASCHNG
03392                      07,2472  05021  1           DCT     05021
03393                      07,2473  05000  1           DCT     05000

03394  REF   2 LAST 767    07,2474  0 2276 0           TC      MOVETEMP

03395  REF 103 LAST 774    07,2475  0 4161 0  UPDATINT TC      PHASCHNG
0340                       07,2476  05021  1           DCT     05021
034001                     07,2477  05000  1           DCT     05000

03401  REF  75 LAST 773    07,2500  0 6112 0           TC      INTPRET
03402                      07,2501  40575  1           VLOAD   VSR8          FORM TOTAL STATE VECTOR
0341   REF   7 LAST 324    07,2502  01225  0                   DELTAV
0342                       07,2503  53342  1           VSR2    VAD
0343   REF   4 LAST 323    07,2504  01241  1                   REFRCV
0344   REF   7 LAST 773    07,2505  26001  1           STOVL   RRECT
0345   REF   7 LAST 324    07,2506  01233  1                   NUV
0346                       07,2507  53202  1           VSR8    VAD
0347   REF   4 LAST 324    07,2510  01247  1                   REFVCV
0348   REF   1             07,2511  02007  1           STORE   VRECT         TOTAL VEL. VECTOR

0349                       07,2512  66370  0           AXT,1   SSP           SET TIX LOOP TO TRANSFORM STATE TO SM
0350                       07,2513  00014  1                   12D
0351   REF  24 LAST 773    07,2514  00051  0                   S1
0352                       07,2515  00006  1                   6
0353                       07,2516  73773  0  TRANTOSM VLOAD*  VXSC*         TRANSFORM STATE AND RE-STORE IN RRECT
0354   REF   8 LAST 774    07,2517  02015  1                   RRECT +12D,1
0355   REF   4 LAST 773    07,2520  16254  0                   SCLRMDAV +12D,1
0356                       07,2521  76521  0           MXV     VSL1
0357   REF  25 LAST 773    07,2522  01263  1                   REFSMMAT
0358   REF   9 LAST 774    07,2523  06015  0           STORE   RRECT +12D,1  STATE IN SM SYSTEM
0359                       07,2524  77700  0           TIX,1
0360   REF   1             07,2525  16516  1                   TRANTOSM
0361                       07,2526  77776  1           EXIT

0362                       07,2527  0 0004 0           INHINT                INHIBIT INTERUPT TO STORE STATE IN RN
0363   REF   4 LAST 471    07,2530  3 7764 0           CAF     ELEVEN        INITIALIZE INDEX TO DEC 11
0364   REF  36 LAST 365    07,2531  54 070 1  STATORN  TS      RUPTREG1
0365   REF  37 LAST 774    07,2532  50 070 0           INDEX   RUPTREG1
0366   REF  10 LAST 774    07,2533  3 1400 1           CA      RRECT         PICK RRECT + NEXT 11 REGS
0367   REF  38 LAST 774    07,2534  50 070 0           INDEX   RUPTREG1
0368   REF   7 LAST 766    07,2535  55'010 0           TS      RN            JAM IN RN TO RN+11 FOR DOWNLINK
0369   REF  39 LAST 774    07,2536  10 070 1           CCS     RUPTREG1
0370   REF   1             07,2537  1 2531 0           TCF     STATORN
0371                       07,2540  0 0006 1           EXTEND
0372   REF   5 LAST 327    07,2541  3 1257 0           DCA     TE            GET STATE TIME
0373   REF   2 LAST 337    07,2542  53'327 1           DXCH    STATTME
```

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```
0374                        07,2543  0 0003 1          RELINT          STATE AND TIME IN DOWNLINK REGS

0375   REF   8 LAST 773     07,2544  0 6076 0  INTOUT  TC     FLAGDOWN REMOVE ORBITAL INTEGRATION FLAG
0376                        07,2545   00100 0          DCT    100

03761  REF 104 LAST 774     07,2546  0 4161 0          TC     PHASCHNG
03762                       07,2547   00001 0          DCT    00001

0377   REF  88 LAST 765     07,2550  0 5567 0          TC     ENDOFJOB
```

L ORBITAL INTEGRATION PROGRAM USER'S OWN PAGE NO. 1 S3

R0069 FBR3 SETS UP A TIMESTEP CALL TO KEPLER.

```
0070                        07,2551  50545 0  FBR3    DLOAD   SR3
0071  REF   1              07,2552  02165 1           H
0072                        07,2553  43262 0  SR3R    DAD
0073  REF   2 LAST 766      07,2554  02045 1           TC
0074  REF   1              07,2555  16161 0  STODL   TAU

0075  REF   3 LAST 770      07,2556  17755 0           EARTHTAB +9D
0076                        07,2557  54205 1  DMP     SRR
0077  REF   5 LAST 767      07,2560  02163 1           DT/2
0078                        07,2561  21615 0           120
0079                        07,2562  77615 0  DAD
0080  REF   6 LAST 773      07,2563  02047 0           TET
0081  REF   7 LAST 776      07,2564  02047 0  STORE   TET
```

L ORBITAL INTEGRATION PROGRAM USER'S OWN PAGE NO. 2 S3

P0088 THIS ORBITAL KEPLER SUBROUTINE FINDS THE POSITION AND VELOCITY OF THE VEHICLE AFTER TIME FOUND IN GIVEN
R0090 SINCE RECTIFICATION TO POSITION RRECT AND VELOCITY VRECT. THE RESULTING POSITION AND VELOCITY ARE LEFT IN
R0092 FOUNDR AND FOUNDV, RESPECTIVELY.

0093			07,2565	40375 1	KEPLER	VLOAD	SETPD	UNIT OF RECTIFICATION POSITION TO 0
0094	REF	11 LAST 774	07,2566	02001 1			RRECT	
0095			07,2567	00001 0			0	
0096			07,2570	65256 0		UNIT	PDDL	AND LENGTH OF ORIGINAL IN 6
0097			07,2571	00045 0			36D	
0098			07,2572	77715 1		PDVL		LENGTH OF POSITION AT RECTIFICATION.
0099	REF	2 LAST 774	07,2573	02007 1			VRECT	
0100			07,2574	61436 1		VSQ	ROUND	
0101			07,2575	45205 1		DMP	DSU	
0102			07,2576	00007 0			6	LENGTH OF POSITION AT RECTIFICATION
0103	REF	1	07,2577	17702 1			DP1/4	
0104			07,2600	41532 0		SL2R	PUSH	A4 TO REGISTER 8
0105			07,2601	57502 1		SR2	DCOMP	
0106			07,2602	56215 1		DAD	DDV	
0107	REF	2 LAST 777	07,2603	17702 1			DP1/4	
0108			07,2604	00007 0			6	
0109			07,2605	50315 0		PDVL	DOT	ALPHA TO REGISTER 10
0110	REF	12 LAST 777	07,2606	02001 1			RRECT	
0111	REF	3 LAST 777	07,2607	02007 1			VRECT	
0112			07,2610	63306 1		ROUND	PDVL	A1 TO REGISTER 12
0113	REF	2 LAST 766	07,2611	02031 1			RCV	
0114			07,2612	50256 0		UNIT	DOT	
0115	REF	1	07,2613	02037 1			VCV	
0116			07,2614	77725 1		PDDL		IR/2.VC IN 14D.
0117			07,2615	00045 0			36D	
0118	REF	1	07,2616	16155 1		STODL	ALPHAM	RC IN ALPHAM
0119	REF	6 LAST 776	07,2617	02163 1			DT/2	
0120			07,2620	54442 1		SR3	SR3R	
0121			07,2621	77071 1		DDV	AXT,2	
0122	REF	2 LAST 777	07,2622	02155 1			ALPHAM	
0123			07,2623	00012 1			10D	MAX ITERATION COUNT IS 10

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```
0124                        07,2624  56325 0        2DDL    DDV       Q IN 16
0125  REF  3 LAST 777       07,2625  17702 1                DP1/4
0126  REF  3 LAST 777       07,2626  02155 1                ALP+AM
0127                        07,2627  57225 0        DSJ     DMPR
0128                        07,2630  00013 0                10D       1/4RC : ALPHA
0129                        07,2631  00021 1                16D       Q( )
0130                        07,2632  57275 0        DMPR    DMPR
0131                        07,2633  00021 1                16D       QQ( )
0132  REF  1                07,2634  17704 1                DP1/2
0133                        07,2635  52452 0        SL3     SL3
0134                        07,2636  57325 1        2DDL    DMPR
0135                        07,2637  00017 1                14D
0136                        07,2640  00021 1                16D
0137                        07,2641  41412 0        SL4     PUSH      16(UR/2,VC)Q IN 20
0138                        07,2642  57221 1        3DSJ    DMPR
0139  REF  1                07,2643  17730 0                DP1/2
0140                        07,2644  45221 1        3DSJ    DSJ
0141  REF  2 LAST 778       07,2645  17730 0                DP1/2
0142                        07,2646  76405 1        DMP     SL1R
0143                        07,2647  66215 1        DAD     SSP
0144  REF  1                07,2650  02051 1                X<EP
0145  REF  14 LAST 427      07,2651  00052 0                S2
0146                        07,2652  00001 0                1
0147  REF  2 LAST 778       07,2653  02051 1        STORE   X<EP
```

P0148 ITERATING EQUATIONS - GIVEN X IN MPAC, FIND TIME OF FLIGHT.

```
0149                        07,2654  61516 1  KTIMEN+1 DSQ     ROUND     FORM ALPHA X-SQUARED AND CALL S AND C
0150                        07,2655  66405 0           DMP     SL2R
0151                        07,2656  00013 0                   10D
0152                        07,2657  45001 1           SETPD   CALL      SET PD INDICATOR TO 16
0153                        07,2660  00021 1                   16D
0154  REF  1                07,2661  16751 0                   S(X),C(X)
0155                        07,2662  42405 0           DMP     SL4
0156  REF  3 LAST 778       07,2663  02051 1                   XKEP
0157                        07,2664  72405 0           DMP     SL1
0158  REF  4 LAST 779       07,2665  02051 1                   XKEP
0159                        07,2666  76405 0           DMP     SL1R
0160  REF  5 LAST 779       07,2667  02051 1                   XKEP
0161                        07,2670  00030 1           STORE   23D       A3
0162                        07,2671  65275 1           DMPR    PDDL
0163                        07,2672  00011 1                   8D
0164  REF  6 LAST 779       07,2673  02051 1                   XKEP
0165                        07,2674  42405 0           DMP     SL4
0166                        07,2675  00021 1                   16D       VALUE OF C
0167                        07,2676  41352 0           SL1     DMP
0168  REF  7 LAST 779       07,2677  02051 1                   XKEP
0169                        07,2700  77732 1           SL2R
0170                        07,2701  00026 0           STORE   21D       A2
0171                        07,2702  74405 0           DMP     SR1R
0172                        07,2703  00015 0                   12D       A1
0173                        07,2704  77615 0           DAD
0174                        07,2705  57325 1           PDDL    DMPR
0175                        07,2706  00007 0                   6
0176  REF  8 LAST 779       07,2707  02051 1                   XKEP
0177                        07,2710  77615 0           DAD
0178                        07,2711  44206 0           PUSH    BDSU      COMPARE WITH GIVEN TIME OF FLIGHT
0179  REF  1                07,2712  02161 0                   GIVENT
0180                        07,2713  00021 1           STORE   16D       DIFFERENCE TO REGISTER 16
0181                        07,2714  77776 1           EXIT
```

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```
0182  REF  76 LAST 774   07,2715  0 6112 0  DUMPDUMP  TC      INTPRET         FOR DUMP ONLY *******
0183                     07,2716    45246 0            ABS     DSU
0184  REF   1            07,2717    17674 1                    <EPSILON        SEE IF WITHIN EPSILON OF GIVEN TIME.
0185                     07,2720    61040 1            BMN     TIX,2           IF SO, GET R AND V AND EXIT.
0186  REF   1            07,2721    17036 1                    GETRANDV
0187  REF   1            07,2722    16725 0                    GETNEWX
0188                     07,2723    77650 1            GOTO
0189  REF   2 LAST 780   07,2724    17036 1                    GETRANDV
0190                     07,2725    41345 0  GETNEWX    DLOAD   DMP
0191                     07,2726    00013 0                    10D             ALPHA
0192                     07,2727    00030 1                    23D             A3
0193                     07,2730    44332 0            SL2R    BDSU
0194  REF   9 LAST 779   07,2731    02051 1                    XCHEP
0195                     07,2732    46405 1            DMP     SL4R
0196                     07,2733    00015 0                    12D             A1
0197                     07,2734    14023 0            STODL   18D
0198                     07,2735    00026 0                    21D             A2
0199                     07,2736    76405 1            DMP     SL1R
0200                     07,2737    00011 1                    8D              A4
0201                     07,2740    77615 0            DAD
0202                     07,2741    65215 1            DAD     PDDL
0203                     07,2742    00007 0                    6               R0
0204                     07,2743    00021 1                    16D
0205                     07,2744    43271 1            DDV     DAD
0206                     07,2745    00023 0                    18D
0207  REF  10 LAST 780   07,2746    02051 1                    XCHEP
0208  REF  11 LAST 780   07,2747    36051 0            STCALL  XCHEP
0209  REF   1            07,2750    16654 1                    <TIMEN+1
```

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P0210 SUBROUTINE FOR COMPUTING THE UNIVERSAL CONIC FUNCTIONS S(X) AND C(X). THE ACTUAL OUTPUT OF THIS ROUTINE
R0212 CONSISTS OF SCALED VERSIONS DEFINED AS FOLLOWS -

R0213 $S_S(X) = S(64X)$ $C_S(X) = C(64X)/4$
R0214

R0215 IT IS ASSUMED THAT THE INPUT ARRIVES IN MPAC,MPAC+1 AND THAT IT LIES BETWEEN -30/64 AND 40/64. UPON EXIT,
R0217 S(X) WILL BE LEFT IN MPAC,MPAC+1 AND C(X) ON TOP OF THE PUSHDOWN LIST.

```
0218                    07,2751  00043 0  S(X)C(X)  STORE   34D          X TO 34D
0219                    07,2752  63434 1           RTB     DSQ
0220   REF   1          07,2753  17000 1           A(X)
0221                    07,2754  41506 1           ROUND   PUSH
0222                    07,2755  00045 0           STORE   36D          A SQUARED TO 36D
0223                    07,2756  76405 1           DMP     SL1R
0224                    07,2757  00043 0           34D
0225                    07,2760  57221 1           BDSU    DMPR         C (X) = A (.25 - 2XA ) TO PD LIST
0226   REF   1          07,2761  17702 1           POS1/4                S
0227                    07,2762  00045 0           36D
0228                    07,2763  64525 1           PDDL    SR2R         2
0229                    07,2764  47125 1           PDDL    RTB          A /4 TO PD LIST
0230                    07,2765  00043 0           34D
0231   REF   1          07,2766  17017 1           B(X)
0232                    07,2767  61516 1           DSQ     ROUND
0233                    07,2770  57325 1           PDDL    DMPR         B SQUARED TO PD LIST
0234                    07,2771  00043 0           34D
0235                    07,2772  00045 0           36D
0236                    07,2773  57221 1           BDSU    DMPR                  2      2   2
0237   REF   1          07,2774  17706 0           POS1/16               LEAVES S (X)=B (.0625-A X)+A /4 IN MPAC
0238                    07,2775  43415 0           DAD     ITCQ                   S
0239                    07,2776  74631 0  -1/12     2DEC    -.1          DONT MOVE.
C0239                   07,2777  63145 1
```

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```
P0240   A AND B POLYNOMIALS WHOSE COEFFICIENTS WERE OBTAINED WITH THE *AUTOCURVEFIT* PROGRAM.
 0242   REF   1              07,3000  0 7274 1  A(X)     TC     POLY
 0243                        07,3001  00004 0            2DEC   4
 0244                        07,3002  26501 1            2DEC    7.071067810 E-1
C0244                        07,3003  07463 1
 0245                        07,3004  60724 0            2DEC   -4.714045180 E-1
C0245                        07,3005  60210 1
 0246                        07,3006  03010 0            2DEC    9.42808914  E-2
C0246                        07,3007  26256 1
 0247                        07,3010  77554 0            2DEC   -8.9791893   E-3
C0247                        07,3011  74242 0
 0248                        07,3012  00010 0            2DEC    4.989987    E-4
C0248                        07,3013  05475 1
 0249                        07,3014  77777 0            2DEC   -1.79357     E-5
C0249                        07,3015  66460 0
 0250   REF   4 LAST 364     07,3016  0 6125 1           TC     DANZIG
 0251   REF   2 LAST 782     07,3017  0 7274 1  B(X)     TC     POLY
 0252                        07,3020  00004 0            2DEC   4
 0253                        07,3021  32101 0            2DEC    8.164965793 E-1
C0253                        07,3022  17270 1
 0254                        07,3023  65431 1            2DEC   -3.265986572 E-1
C0254                        07,3024  40174 1
 0255                        07,3025  01710 0            2DEC    5.90988980  E-2
C0255                        07,3026  10660 0
 0256                        07,3027  77676 0            2DEC   -4.0085592   E-3
C0256                        07,3030  52270 0
 0257                        07,3031  00004 0            2DEC    2.781528    E-4
C0257                        07,3032  21652 0
 0258                        07,3033  77777 0            2DEC   -1.25610     E-5
C0258                        07,3034  71323 0
 0259   REF   5 LAST 782     07,3035  0 6125 1           TC     DANZIG
```

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P0260 ROUTINE FOR OBTAINING R AND V, NOW THAT THE PROPER X HAS BEEN FOUND.

```
0261                        07,3036  40345 1  GETRANDV DLOAD   SETPD
0262                        07,3037  00026 0           21D     A2 FROM LAST ITERATION
0263                        07,3040  00032 0           25D
0264                        07,3041  74276 1           DCOMP   VXSC
0265                        07,3042  00001 0           0       UNIT OF GIVEN POSITION VECTOR
0266                        07,3043  45325 1           PDDL    DSU
0267                        07,3044  00023 0           18D     LAST VALUE OF T
0268                        07,3045  00030 1           23D     LAST VALUE OF A3
0269                        07,3046  74312 1           SL2     VXSC
0270  REF   4 LAST 777     07,3047  02007 1                   VRECT
0271                        07,3050  76455 1           VAD     VSL1    ADDITION MUST BE DONE IN THIS ORDER
0272                        07,3051  53206 0           PUSH    VAD
0273  REF  13 LAST 777     07,3052  02001 1                   RRECT
0274                        07,3053  45455 1           VAD     STADR
0275  REF   1               07,3054  75746 0           STORE   FOUNDR  RESULTING CONIC POSITION
0276                        07,3055  77646 0           ABVAL
0277                        07,3056  14021 1           STODL   16D
0278                        07,3057  00013 0           10D     ALPHA
0279                        07,3060  66405 0           DMP     SL2R
0280                        07,3061  00030 1           23D     A3
0281                        07,3062  56225 1           DSU     DDV
0282  REF  12 LAST 780      07,3063  02051 1                   XKEP
0283                        07,3064  00021 1           16D     LENGTH OF FOUND POSITION
0284                        07,3065  72561 0           VXSC    VSL2
0285                        07,3066  00001 0           0       UNIT OF RECTIFICATION POSITION
0286                        07,3067  70525 1           PDDL    SR1
0287                        07,3070  00021 1           16D
0288                        07,3071  56225 1           DSU     DDV
0289                        07,3072  00026 0           21D
0290                        07,3073  00021 1           16D
0291                        07,3074  53361 0           VXSC    VAD
0292  REF   5 LAST 783      07,3075  02007 1                   VRECT
0293                        07,3076  77772 0           VSL1
0294  REF   1               07,3077  36037 0           STCALL  FOUNDV  THIS COMPLETES THE CALCULATION
0295  REF   1               07,3100  02171 1                   ABRANCH
```

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P0296 THE POSTRUE ROUTINES SET UP THE BETA VECTOR AND OTHER INITIAL CONDITIONS FOR THE NEXT ACCOMP.

```
0298                        07,3101   77331 0  POSTRUE  SSP     VLOAD          TIME STEP CALLS TO KEPLER RETURN HERE
0299  REF   1              07,3102   02207 0           SCALEA
0300                        07,3103   00004 0           4
0303  REF   1              07,3104   02053 0           ALPHAV
0304                        07,3105   53261 1           VSR     VAD
0305                        07,3106   20613 1           10D
0306  REF   3 LAST 777      07,3107   02031 1           RCV            POSITION OUTPUT OF KEPLER
0307                        07,3110   43154 0           -XA,2   BOF
0308  REF   9 LAST 770      07,3111   02205 1           DIFEQCNT
0309  REF   2 LAST 770      07,3112   00340 0           NMATFLAG
0310  REF   1              07,3113   17115 1           NOSAVE1
0311  REF   1              07,3114   12111 0           STORE   VECTAB,2
0312                        07,3115   66331 0  NOSAVE1  SSP     SSP            SETS UP SCALE B AND GMODE
0314  REF   1              07,3116   02210 0           SCALEB
0315                        07,3117   00016 0           14D
0316  REF   1              07,3120   02173 0           GMODE
0317                        07,3121   00002 0           2
0318  REF   1              07,3122   02061 1           STORE   BETAV
```

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P0319 AGC ROUTINE TO COMPUTE ACCELERATION COMPONENTS.

```
0320                        07,3123  53575 0  ACCOMP   VLOAD   UNIT
0321  REF   2 LAST 784     07,3124  02053 0           ALPHAV
0322  REF   3 LAST 785     07,3125  16053 0           STODL   ALPHAV
0323                        07,3126  00045 0           36D
0324  REF   4 LAST 778     07,3127  02155 1           STORE   ALPHAM
0325                        07,3130  77600 1           BOV
0326  REF   1               07,3131  17132 1           ACCOMP2                 TURN OFF OVERFLOW INDICATOR
0327                        07,3132  74575 0  ACCOMP2  VLOAD   VSR1
0328  REF   2 LAST 784     07,3133  02061 1           BETAV
0329                        07,3134  40236 1           VSQ     SETPD
0330                        07,3135  00001 0           0
0331                        07,3136  61501 1           NORM    ROUND
0332  REF   25 LAST 774    07,3137  00051 0           S1
0333                        07,3140  60325 0           PDDL    NORM            NORMED B SQUARED TO PD LIST
0334  REF   5 LAST 785     07,3141  02155 1           ALPHAM                  NORMALIZE (LESS ONE) LENGTH OF ALPHA
0335  REF   4 LAST 678     07,3142  00047 1           X1                      SAVING NORM SCALE FACTOR IN X1
0336                        07,3143  63342 1           SR1     PDVL
0337  REF   3 LAST 785     07,3144  02061 1           BETAV                   C(PDL+2) = ALMOST NORMED ALPHA
0338                        07,3145  77656 1           UNIT
0339  REF   4 LAST 785     07,3146  16061 1           STODL   BETAV
0340                        07,3147  00045 0           36D
0341  REF   1               07,3150  02157 0           STORE   BETAM
0342                        07,3151  55301 0           NORM    DDV             FORM NORMALIZED QUOTIENT ALPHAM/BETAM
0343  REF   1               07,3152  00050 1           X2
0344                        07,3153  41562 0           SR1R    PUSH            C(PDL+2) = ALMOST NORMALIZED RHO.
0345                        07,3154  57144 1           LXC,2   XAD,2
0346  REF   2 LAST 785      07,3155  00047 1           X2                      C(X2) = -SCALE(RHO) + 1
0347  REF   2 LAST 784      07,3156  02206 1           SCALFA                        = -S(B)-N(B)+S(A)+N(A)+1
0348                        07,3157  55074 1  XAD,2    XSU,2
0349  REF   5 LAST 785      07,3160  00046 0           X1
0350  REF   2 LAST 784      07,3161  02207 0           SCALFB
0351                        07,3162  53714 0  INCR,2   SR*
0352                        07,3163  00002 0           2
0353                        07,3164  57176 0           0,2
0354                        07,3165  64406 1           PUSH    SR2R            RHO/4 PD+6
0355                        07,3166  50315 0           PDVL    DOT
0356  REF   4 LAST 785      07,3167  02053 0           ALPHAV
0357  REF   5 LAST 785      07,3170  02061 1           BETAV
0358                        07,3171  44372 1           SL1R    BDSU            (RHO/4) - 2(ALPHAV/2,BETAV/2)
0359                        07,3172  57206 1           PUSH    DMPR            TO PDL+6
0360                        07,3173  00005 1           4
```

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```
0361                        07,3174  43206 1          PUSH   DAD       Q/4 = RHO(C(PDL+4)) TO PD+8D
0362  REF   1               07,3175  17702 1                 DQUARTER  (Q+1)/4 TO PD+10D
0363                        07,3176  75406 1          PUSH   SQRT      3/2
0364                        07,3177  41475 1          DMPR   PUSH      ((Q+1)/4)    TO PD+12D
0365                        07,3200  00013 0                 10D
0366                        07,3201  43352 1          SL1    DAD
0367  REF   2 LAST 786     07,3202  17702 1                 DQUARTER                  3/2
0368                        07,3203  43325 1          PDDL   DAD       (1/4)+2((Q+1)/4)    TO PD+14D
0369                        07,3204  00013 0                 10D
0370  REF   3 LAST 778     07,3205  17730 0                 DP1/2
0371                        07,3206  72475 1          DMPR   SL1
0372                        07,3207  00011 1                 8D
0373                        07,3210  56215 1          DAD    DDV
0374  REF   1               07,3211  17676 0                 THREE/8
0375                        07,3212  00017 1                 14D
0376                        07,3213  74275 1          DMPR   VXSC
0377                        07,3214  00007 0                 6
0378  REF   6 LAST 785      07,3215  02061 1                 BETAV     -
0379                        07,3216  64515 1          PDVL   VSR3      (G/2)(C(PD+4))B/2 TO PD+16D
0380  REF   5 LAST 785      07,3217  02053 0                 ALPHAV
0381                        07,3220  41455 0          VAD    PUSH      A12 + C(PD+16D) TO PD+16D
0382                        07,3221  41345 0          DLOAD  DMP
0383                        07,3222  00001 0                 0
0384                        07,3223  00015 0                 12D       -
0385                        07,3224  61501 1          NORM   ROUND     GAMMA TO PD+22D
0386  REF  15 LAST 778      07,3225  00052 0                 S2        - SCALE(GAMMA)-1 TO X1
0387                        07,3226  70065 0          BDDV   LXC,1
0388                        07,3227  00003 1                 2
0389  REF   3 LAST 785      07,3230  00047 1                 X2        C(X2) = SCALE(RHO)
0390                        07,3231  56070 0          XAD,1  XAD,1
0391  REF  16 LAST 786      07,3232  00051 0                 S2        C(S2) = N((B.B/4)(....)3/2)
0392  REF  26 LAST 785      07,3233  00050 1                 S1        C(S1) = N(B.B/4)
0393                        07,3234  56070 0          XAD,1  XAD,1
0394  REF   3 LAST 785      07,3235  02207 0                 SCALEB
0395  REF   4 LAST 786      07,3236  02207 0                 SCALEB
0396                        07,3237  74276 1          DCOMP  VXSC
0397                        07,3240  00021 1                 16D       RESULT OF PRECEDING EQUATION
0398                        07,3241  73206 1          PUSH   GOTO
0399  REF   2 LAST 784      07,3242  02173 0                 GMODF
0400  REF   1               07,3243  17244 0                 GTABLE
0401  REF   1               07,3244  17315 0  GTABLE CADR    GMODE10
0402  REF   1               07,3245  17276 1         CADR    GMODF11
0403  REF   1               07,3246  17247 0         CADR    GMODF12
```

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P0404 THE GMODE12 ROUTINE SETS UP THE SECONDARY BODY DISTURBING ACCELERATION FOR ACCOMP.

```
0406                        07,3247  77657 0  GMODE12  VSL*                -SCALE(GAMMA)-1 IS LEFT IN X1.
0407                        07,3250  20240 0           31D,1               ADJUST GAMMA TO SCALE OF -32
0408  REF   1               07,3251  26103 1           STOVL  FV
0409  REF   7 LAST 786      07,3252  02061 1                  BETAV
0410  REF   6 LAST 786      07,3253  16053 0           STODL  ALPHAV        BETA VECTOR INTO ALPHA FOR NEXT ACCOMP
0411  REF   2 LAST 785      07,3254  02157 0                  BETAM
0412  REF   6 LAST 785      07,3255  02155 1           STORE  ALPHAM
0413                        07,3256  45014 0           BOFF   CALL
0414  REF   2 LAST 770      07,3257  00342 1                  MIDFLAG
0415  REF   1               07,3260  17322 1                  OBLATEST
0416  REF   1               07,3261  17735 0                  MOONPOS
0417  REF   8 LAST 787      07,3262  02061 1           STORE  BETAV         MOON(EARTH) POSITION WILL BE BETA NEXT
0418                        07,3263  43150 1           LXA,1  BOF
0419  REF  10 LAST 784      07,3264  02205 1                  DIFFCNT       SAVE R/QV IN VECTAB FOR W-MATRIX UPDATE
0420  REF   3 LAST 784      07,3265  00340 0                  WMATFLAG
0421  REF   1               07,3266  17270 1                  NOSAVE2
0422  REF   2 LAST 784      07,3267  06117 0           STORE  VECTAB +6,1
0423                        07,3270  65174 0  NOSAVE2  AXT,2  XCHX,2        SET UP ALPHAM AND SCALEA
0424                        07,3271  00023 0                  19D           SCALE FOR R/QV
0425  REF   5 LAST 786      07,3272  02207 0                  SCALEB        SWAP SCALEB AND X2
0426                        07,3273  52134 0           SXA,2  GOTO
0427  REF   3 LAST 785      07,3274  02206 1                  SCALEA
0428  REF   2 LAST 785      07,3275  17132 1                  ACCOMP2       ENTRY IF UNIT(ALPHAV) AVAILABLE
```

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```
P0429   THE GMODE11 ROUTINE SETS UP THE SUNS DISTURBING ACCELERATION.

 0430                          07,3276  45144 1  GMODE11  _XC*2   CALL              SET X2 TO TABLE OF PROPER CONSTANTS
 0431  REF   7 LAST 770       07,3277  02227 1           PBODY
 0432  REF   1                07,3300  17434 1           ADDTOFV
 0433                          07,3301  77624 1           CALL                      BARICENTER-TO-SUN POSITION VECTOR.
 0434  REF   1                07,3302  17737 1           SUNPOS                    LEAVES VECTOR IN PDL
 0435                          07,3303  76750 1           _XA,1    VLOAD*           COMPUTE R/PS USING CORRECT TABLE FOR
 0436  REF  11 LAST 787       07,3304  02205 1           DIFEQCNT                  MASS RATIO, ETC.
 0437  REF   3 LAST 787       07,3305  02117 1           VECTAB +6,1
 0438                          07,3306  53357 0           VXSC*    VAD
 0439                          07,3307  77770 1           6,2                       USE SCALAR AT ENTRY 6 IN THE TABLE
 0440                          07,3310  66170 1           AXT,1    SXA,1
 0441                          07,3311  00034 0           2BJ
 0442  REF   6 LAST 787       07,3312  02207 0           SCALEB                    SET SCALEB AND RETURN TO ACCOMP
 0443  REF   9 LAST 787       07,3313  36061 0           STCALL   BETAV
 0444  REF   3 LAST 787       07,3314  17132 1           ACCOMP2

R0445   THE GMODE10 ROUTINE ADDS IN THE SUNS PERTURBING ACCELERATION AND COMPUTES THE OBLATENESS CONTRIBUTION
 0447                          07,3315  63144 0  GMODE10  _XC,2   INCR,2
 0448  REF   8 LAST 788       07,3316  02227 1           PBODY
 0449                          07,3317  77774 0           DEC      -3
 0450                          07,3320  77624 1           CALL
 0451  REF   2 LAST 788       07,3321  17434 1           ADDTOFV
 0452                          07,3322  77614 1  OBLATEST BON
 0453  REF   2 LAST 770       07,3323  00303 1           MOONFLAG
 0454  REF   1                07,3324  17422 0           VBRANCH
```

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P0455 THE OBLATE ROUTINE COMPUTES THE ACCELERATION DUE TO THE EARTHS OBLATENESS. IT USES THE UNIT OF THE VEHICLE
R0457 POSITION VECTOR FOUND IN ALPHAV AND THE DISTANCE TO THE CENTER IN ALPHAM. THIS IS ADDED TO THE SUM OF THE
R0459 DISTURBING ACCELERATIONS IN FV AND THE PROPER DIFEQ STAGE IS CALLED VIA X1.

0461			07,3325	77745 1	OBLATE	DLOAD		
0462	REF	7 LAST 787	07,3326	02057 1			ALPHAV +4	Z COMPONENT OF POSITION IS COS PHI
0463			07,3327	57201 0		SETPD	DMPR	
0464			07,3330	00001 0			0	
0465	REF	1	07,3331	17712 0			3/4	
0466			07,3332	63525 0		PDDL	DSQ	P2:/8 TO REGISTER 0
0467	REF	8 LAST 789	07,3333	02057 1			ALPHAV +4	
0468			07,3334	57252 0		SL3	DMPR	
0469	REF	1	07,3335	17710 1			15/16	
0470			07,3336	41425 1		DSU	PUSH	P3:/4 TO REGISTER 2
0471	REF	1	07,3337	17676 0			3/8	
0472			07,3340	57275 0		DMPR	DMPR	
0473	REF	9 LAST 789	07,3341	02057 1			ALPHAV +4	
0474	REF	1	07,3342	17716 1			7/12	
0475			07,3343	65352 0		SL1	PDDL	P4:/16 TO REGISTER 4
0476			07,3344	00001 0			0	
0477			07,3345	44275 1		DMPR	BDSU	
0478	REF	1	07,3346	17734 1			2/3	
0479			07,3347	57206 1		PUSH	DMPR	BEGIN COMPUTING P5:/128
0480	REF	10 LAST 789	07,3350	02057 1			ALPHAV +4	
0481			07,3351	65275 1		DMPR	PDDL	
0482	REF	1	07,3352	17720 1			9/16	
0483			07,3353	00003 1			2	
0484			07,3354	44275 1		DMPR	BDSU	FINISH P5:/128 AND TERM USING UNIT
0485	REF	1	07,3355	17722 0			5/128	POSITION VECTOR AT ALPHA
0486			07,3356	62405 1		DMP	SL2	
0487	REF	1	07,3357	17726 1			J4REQ/J3	
0488			07,3360	43271 1		DDV	DAD	
0489	REF	7 LAST 787	07,3361	02155 1			ALPHAM	
0490			07,3362	00005 1			4	
0491			07,3363	56275 1		DMPR	DDV	
0492	REF	1	07,3364	17724 0			2J3REQ/J2	
0493	REF	8 LAST 789	07,3365	02155 1			ALPHAM	
0494			07,3366	74215 1		DAD	VXSC	
0495			07,3367	00003 1			2	
0496	REF	11 LAST 789	07,3370	02053 0			ALPHAV	
0497	REF	12 LAST 789	07,3371	16053 0		STODL	ALPHAV	

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```
0498                        07,3372  72405 0          DMP     SL1          COMPUTE TERM USING IZ
0499  REF   2 LAST 789     07,3373  17726 1                  J4REQ/J3
0500                        07,3374  43271 1          DDV     DAD
0501  REF   9 LAST 789     07,3375  02155 1                  ALPHAM
0502                        07,3376  50525 0          PDDL    SR3
0503  REF   2 LAST 789     07,3377  17724 0                  2J3RE/J2
0504                        07,3400  77675 0          DMPR
0505                        07,3401  43271 1          DDV     DAD
0506  REF  10 LAST 790     07,3402  02155 1                  ALPHAM
0507                        07,3403  77621 1          BDSU
0508  REF  13 LAST 789     07,3404  02057 1                  ALPHAV +4
0509  REF  14 LAST 790     07,3405  16057 1          STODL   ALPHAV +4
0510  REF  11 LAST 790     07,3406  02155 1                  ALPHAM
0511                        07,3407  63516 0          DSQ     DSQ
0512                        07,3410  55301 0          NORM    BDDV
0513  REF   6 LAST 785     07,3411  00047 1                  X1
0514  REF   1               07,3412  17714 0                  J2REQSQ
0515                        07,3413  62161 0          VXSC    INCR,1
0516  REF  15 LAST 790     07,3414  02053 0                  ALPHAV
0517                        07,3415  00004 0                  4
0518                        07,3416  53257 1          VSL*    VAD          SHIFTS LEFT ON +, RIGHT ON -.
0519                        07,3417  20201 0                  0,1
0520  REF   2 LAST 787     07,3420  02103 1                  FV
0521  REF   3 LAST 790     07,3421  02103 1          STORE   FV
0522                        07,3422  72135 0  NBRANCH  SLOAD  LXA,1
0523  REF  12 LAST 788     07,3423  02206 1                  DIFEQCNT
0524  REF 292 LAST 740     07,3424  00144 0                  MPAC
0525                        07,3425  73205 1          DMP     CGOTO
0526  REF   1               07,3426  16777 1                  -1/12
0527  REF 293 LAST 790     07,3427  00145 1                  MPAC
0528  REF   1               07,3430  17431 1                  DIFEQTAB
0529  REF   1               07,3431  17526 0  DIFEQTAB CADR   DIFEQ+0
0530  REF   1               07,3432  17532 0           CADR   DIFEQ+1
0531  REF   1               07,3433  17543 0           CADR   DIFEQ+2
0532                        07,3434  77743 1  ADDTOFV  DLOAD*               SETS UP S1 AND S2 PER PRIMARY BODY TABLE
0533                        07,3435  77776 1                  0,2
0534  REF  27 LAST 786     07,3436  24051 0          STOVL   S1
0535                        07,3437  00027 1                  22D
0536                        07,3440  73670 1          XAD,1   VXSC*
0537  REF  28 LAST 790     07,3441  00050 1                  S1
0538                        07,3442  77775 1                  1,2
0539                        07,3443  53257 1          VSL*    VAD
0540                        07,3444  20240 0                  31D,1
0541  REF   4 LAST 790     07,3445  02103 1                  FV
0542  REF   5 LAST 790     07,3446  02103 1          STORE   FV
0543                        07,3447  77616 0          ITCQ
```

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P0544 BEGIN INTEGRATION STEP WITH RECTIFICATION TEST.

```
0545                        07,3450  77775 1  TIMESTEP VLOAD                 MOVE TEMPORARY DELTA AND NU VECTORS
0546  REF   2 LAST 766     07,3451  02023 1                  TNUV            TO WORKING STORAGE
0547  REF   1               07,3452  26222 1           STOVL  ZV
0548  REF   2 LAST 766     07,3453  02015 1                  TDELTAV
0549  REF   1               07,3454  02214 1           STORE  VV
0550                        07,3455  45246 0           ABVAL  DSU             RECTIFICATION REQUIRED IF THE LENGTH
0551  REF   4 LAST 786     07,3456  17730 0                  DP1/2           OF DELTA IS GREATER THAN .5 (8<14).
0552                        07,3457  45040 1           BMN    CALL
0553  REF   1               07,3460  17462 1                  INTGRATE
0554  REF   2 LAST 772     07,3461  17500 1                  RECTIFY
0555                        07,3462  66331 0  INTGRATE SSP    SSP             INITIALIZE INDICES AND SWITCHES
0556  REF   1               07,3463  02171 1                  FBRANCH         EXIT FROM DIFEQCOM
0557  REF   1               07,3464  16551 1           CADR   FBR3
0558  REF   2 LAST 783     07,3465  02172 1                  HBRANCH         EXIT FROM KEPLER
0559  REF   1               07,3466  17101 1           CADR   POSTRUE
0560                        07,3467  77614 1           CLEAR
0561  REF   1               07,3470  00261 1                  JSWITCH         1 FOR W MATRIX EXTRAPOLATE, 0 OTHERWISE.
0562                        07,3471  77775 1  DIFEQQ   VLOAD                  POSITION DEVIATION INTO ALPHA
0563  REF   2 LAST 791     07,3472  02214 1                  VV
0564  REF  16 LAST 790     07,3473  16053 0           STODL  ALPHAV
0565  REF   1               07,3474  17732 1                  DPZERO
0566  REF   2 LAST 776     07,3475  02165 1           STORE  H               START H AT ZERO. GOES 0(DELT/2)DELT.
0567  REF  13 LAST 790     07,3476  36206 0           STCALL DIFEQCNT        ZERO DIFEQCNT AND REGISTER FOLLOWING.
0568  REF   3 LAST 791     07,3477  02171 1                  HBRANCH         GOES 0(-12D)(-24D).
```

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P0569 THE RECTIFY SUBROUTINE IS CALLED BY THE INTEGRATION PROGRAM AND OCCASIONALLY BY THE MEASUREMENT INCORPORATION
R0571 ROUTINES TO ESTABLISH A NEW CONIC.

```
0572                          07,3500  40575 1  RECTIFY  VLOAD   VSR8          RECTIFY - FORM TOTAL POSITION AND VEL.
0573  REF   3 LAST 791       07,3501  02015 1            TDELTAV               ADJUST SCALE DIFFERENCE (ASSUMED
0574                          07,3502  53342 1            VSR2    VAD                 CONSTANT HERE.)
0575  REF   4 LAST 784       07,3503  02031 1                    RCV
0576  REF  14 LAST 783       07,3504  02001 1            STORE   RRECT
0577  REF   5 LAST 792       07,3505  26031 1            STOVL   RCV           SET UP CONIC ,ANSWER, FOR TIMESTEP
0578  REF   3 LAST 791       07,3506  02023 1                    TNJV
0579                          07,3507  53202 1            VSR8    VAD           SAME FOR VELOCITY.
0580  REF   2 LAST 777       07,3510  02037 1                    VCV
0581  REF   6 LAST 783       07,3511  02007 1            STORE   VRECT
0582                          07,3512  66370 0            AXT,1   SSP
0583                          07,3513  00014 1                    12D           ZERO DELTA, NU, AND TIME SINCE RECT.
0584  REF  29 LAST 790       07,3514  00051 0                    S1
0585                          07,3515  00002 0                    2
0586  REF   3 LAST 792       07,3516  16037 1            STODL   VCV
0587  REF   2 LAST 791       07,3517  17732 1                    DPZERO
0588  REF   3 LAST 776       07,3520  02045 1            STORE   TC
0589  REF  13 LAST 783       07,3521  02051 1            STORE   XKEP          ZERO X.
0590  REF   3 LAST 791       07,3522  06230 0  ZEROLOOP  STORE   YV +12D,1      INDICES CAUSE LOOP TO ZERO 6 CONSECUTIVE
0591  REF   4 LAST 792       07,3523  06031 0            STORE   TDELTAV +12D,1  DP NUMBERS (DELTA AND NU ARE ADJACENT).
0592                          07,3524  43500 0            TIX,1   ITCQ          LOOP OR START INTEGRATION STEP IF DONE.
0593  REF   1                 07,3525  17522 1                    ZEROLOOP
```

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```
P0594   THE THREE DIFEQ ROUTINES - DIFEQ+0, DIFEQ+12, AND DIFEQ+24 - ARE ENTERED TO PROCESS THE CONTRIBUTIONS AT THE
R0596   BEGINNING, MIDDLE, AND END OF THE TIMESTEP, RESPECTIVELY. THE UPDATING IS DONE BY THE NYSTROM METHOD.
 0598                          07,3526  64575 1  DIFEQ+0  VLOAD   VSR3
 0599   REF   6 LAST 790       07,3527  02103 1           FV
 0600   REF   1                07,3530  36067 0           STCALL  PHIV
 0601   REF   1                07,3531  17635 1           DIFEQCOM
 0602                          07,3532  74575 0  DIFEQ+1  VLOAD   VSR1
 0603   REF   7 LAST 793       07,3533  02103 1           FV
 0604                          07,3534  53206 0           PUSH    VAD
 0605   REF   2 LAST 793       07,3535  02067 1           PHIV
 0606   REF   1                07,3536  26075 1           STOVL   PSIV
 0607                          07,3537  53362 0           VSR1    VAD
 0608   REF   3 LAST 793       07,3540  02067 1           PHIV
 0609   REF   4 LAST 793       07,3541  36067 0           STCALL  PHIV
 0610   REF   2 LAST 793       07,3542  17635 1           DIFEQCOM
 0611                          07,3543  57345 1  DIFEQ+2  DLOAD   DMPR
 0612   REF   3 LAST 791       07,3544  02165 1           H
 0613   REF   1                07,3545  17734 1           DP2/3
 0614                          07,3546  74206 0           PUSH    VXSC
 0615   REF   5 LAST 793       07,3547  02067 1           PHIV
 0616                          07,3550  53372 1           VSL1    VAD
 0617   REF   2 LAST 791       07,3551  02222 1           ZV
 0618                          07,3552  53361 0           VXSC    VAD
 0619   REF   4 LAST 793       07,3553  02165 1           H
 0620   REF   4 LAST 792       07,3554  02214 1           YV
 0621   REF   5 LAST 793       07,3555  26214 1           STOVL   YV
 0622   REF   8 LAST 793       07,3556  02103 1           FV
 0623                          07,3557  53322 1           VSR3    VAD
 0624   REF   2 LAST 793       07,3560  02075 1           PSIV
 0625                          07,3561  76561 1           VXSC    VSL1
 0626                          07,3562  43055 0           VAD     BOFF            SEE IF THIS IS STATE VECTOR OR W COLUMN.
 0627   REF   3 LAST 793       07,3563  02222 1           ZV
 0628   REF   2 LAST 791       07,3564  00341 1           JSWITCH
 0629   REF   1                07,3565  17605 1           ENDSTATE
 0630                          07,3566  77770 1           AXT,1
 0631                          07,3567  00000 1           0
 0632   REF   1                07,3570  12341 1           STORE   W +72D,2        VELOCITY COLUMN VECTOR
 06321                         07,3571  77745 1           DLOAD
 0633   REF   6 LAST 793       07,3572  02214 1           YV
 0634   REF   2 LAST 793       07,3573  12275 1           STORE   W +36D,2        POSITION COLUMN VECTOR
 0635                          07,3574  52104 0           TIX,2   GOTO            **********
 0636   REF   1                07,3575  17577 1           NEXTCOL
 0637   REF   2 LAST 770       07,3576  02204 0           STEPEXIT
```

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```
0638                          07,3577  77773 1  NEXTCOL  VLOAD*          SET UP NEXT COLUMNS OF W MATRIX
0639  REF   3 LAST 793       07,3600  75502 1                   W +36D,2
0640  REF   7 LAST 793       07,3601  32214 1           STODL* Yv
0641  REF   4 LAST 794       07,3602  75436 1                   W +72D,2
0642  REF   4 LAST 793       07,3603  36222 0           STCALL Zv
0643  REF   1                 07,3604  17471 0                  DIFEQ0
0644  REF   4 LAST 792       07,3605  26023 1  ENDSTATE STODL  TNUV
0645  REF   8 LAST 794       07,3606  02214 1                   Yv
0646  REF   5 LAST 792       07,3607  16015 1           STODL  TDELTAV
0647  REF   5 LAST 793       07,3610  02165 1                   H
0648                          07,3611  64402 0           SR4    SR2R
0649                          07,3612  77615 0           DAD
0650  REF   4 LAST 792       07,3613  02045 1                   TC
0651  REF   5 LAST 794       07,3614  02045 1           STORE  TC
0652                          07,3615  77014 1           BOFF   AXT,2
0653  REF   4 LAST 787       07,3616  00340 0                   MMATFLAG
0654  REF   3 LAST 793       07,3617  02204 0                   STEPEXIT
0655                          07,3620  00044 1                   36D
0656                          07,3621  76131 0           SSP    AXT,1
0657  REF  17 LAST 786       07,3622  00052 0                   S2
0658                          07,3623  00006 1                   5
0659  REF   1                 07,3624  17655 1                   DOW**
0660                          07,3625  66130 0           SXA,1  SXA,1
0661  REF   2 LAST 791       07,3626  02170 0                   FBRANCH
0662  REF   4 LAST 791       07,3627  02171 1                   HBRANCH
0663                          07,3630  76014 0           INVERT AXT,1
0664  REF   3 LAST 793       07,3631  00161 1                   JSWITCH
0665                          07,3632  00000 1                   0
0666                          07,3633  77650 1           GOTO
0667  REF   2 LAST 793       07,3634  17577 1                   NEXTCOL
```

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P0668 COMES HERE TO FINISH FIRST TWO DIFEQ COMPUTATIONS.

0669			07,3635	43345 1	DIFEQCOM	DLOAD	DAD	INCREMENT H AND DIFEQCNT.
0670	REF	7 LAST 777	07,3636	02163 1			DT/2	
0671	REF	6 LAST 794	07,3637	02165 1			H	
0672			07,3640	66110 1		INCR,1	SXA,1	
0673			07,3641	77763 0		DEC	-12	
0674	REF	14 LAST 791	07,3642	02205 1			DIFEQCNT	DIFEQCNT SET FOR NEXT ENTRY.
0675	REF	7 LAST 795	07,3643	02165 1		STORE	H	
0676			07,3644	74561 0		VXSC	VSR1	
0677	REF	9 LAST 793	07,3645	02103 1			FV	
0678			07,3646	74255 0		VAD	VXSC	
0679	REF	5 LAST 794	07,3647	02222 1			ZV	
0680	REF	8 LAST 795	07,3650	02165 1			H	
0681			07,3651	77655 1		VAD		
0682	REF	9 LAST 794	07,3652	02214 1			YV	
0683	REF	17 LAST 791	07,3653	36053 1		STCALL	ALPHAV	
0684	REF	3 LAST 794	07,3654	02170 0			FBRANCH	

L ORBITAL INTEGRATION PROGRAM USER'S OWN PAGE NO. 21 53

```
P0685   ORBITAL ROUTINE FOR EXTRAPOLATION OF THE N MATRIX. IT COMPUTES THE SECOND DERIVATIVE OF EACH COLUMN POSITION
R0687   VECTOR OF THE MATRIX AND CALLS THE NYSTROM INTEGRATION ROUTINES TO SOLVETHE DIFFERENTIAL EQUATIONS. THE PROGRAM
R0689   USES A TABLE OF VEHICLE POSITION VECTORS COMPUTED DURING THE INTEGRATION OF THE VEHICLES POSITION AND VELOCITY.
 0691                          07,3655  50575 0  DOW..   VLOAD   VSR6
 0692   REF  18 LAST 795       07,3656  02053 0          ALPHAV
 0693                          07,3657  53513 0          PDVL*   UNIT
 0694   REF   4 LAST 788       07,3660  02111 1                  VECTAB,1
 0695                          07,3661  46315 1          PDVL    VPROJ
 0696   REF  19 LAST 796       07,3662  02053 0          ALPHAV
 0697                          07,3663  52361 1          VXSC    VSU
 0698   REF   1                07,3664  17700 0                  3/16
 0699                          07,3665  41325 0          PDDL    DMP
 0700                          07,3666  00043 0                  34D
 0701                          07,3667  00045 0                  36D
 0702                          07,3670  45541 0          V/SC    STADR
 0703   REF  10 LAST 795       07,3671  41674 1          STCALL  FV
 0704   REF   2 LAST 788       07,3672  17422 0                  NBRANCH
```

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P0705 CONSTANTS

```
 0706                        07,3673  00000 1  EPSILON  OCT    00000
 0707                        07,3674  00002 0           OCT    00002
 0708                        07,3675  14000 1  THREE/8  2DEC   .375
C0708                        07,3676  00000 1
 0709                        07,3677  06000 1  3/16     2DEC   3 B -4
C0709                        07,3700  00000 1
 0710                        07,3701  10000 0  DP1/4    2DEC   .25
C0710                        07,3702  00000 1
 0711                        07,3703  12525 0  DP1/3    2DEC   .333333333
C0711                        07,3704  12525 0
 0712  REF  4 LAST 778               07,3701  DQUARTER  EQUALS DP1/4
 0713                        07,3705  02000 0  PDS1/16  2DEC   .0625
C0713                        07,3706  00000 1
 0714  REF  5 LAST 797               07,3701  PDS1/4    EQUALS DP1/4
 0715  REF  2 LAST 786               07,3675  3/8       EQUALS THREE/8
 0716                        07,3707  36000 1  15/16    2DEC   15. B -4
C0716                        07,3710  00000 1
 0717                        07,3711  30000 1  3/4      2DEC   3.0 B -2
C0717                        07,3712  00000 1
 0718                        07,3713  12577 1  J2REQSQ  2DEC   .335914874      SECOND HARMONIC TIMES SQUARE OF RADIUS.
C0718                        07,3714  24106 0
 0719                        07,3715  22525 0  7/12     2DEC   .5833333333
C0719                        07,3716  12525 0
 0720                        07,3717  22000 1  9/16     2DEC   9 B -4
C0720                        07,3720  00000 1
 0721                        07,3721  01200 1  5/128    2DEC   5 B -7
C0721                        07,3722  00000 1
 0722                        07,3723  77711 0  2J3RE/J2 2DEC   -.003309146
C0722                        07,3724  71033 1
 0723                        07,3725  23377 0  J4REQ/J3 2DEC   .60932709
C0723                        07,3726  06703 0
 0724                        07,3727  20000 0  DP1/2    2DEC   .5
C0724                        07,3730  00000 1
 0725                        07,3731  00000 1  DPZERO   2DEC   0.0
C0725                        07,3732  00000 1
 0726                        07,3733  25252 0  DP2/3    2DEC   .6666666667
C0726                        07,3734  25253 1
 0727  REF  2 LAST 793               07,3733  2/3       EQUALS DP2/3
```

L ORBITAL INTEGRATION PROGRAM USER'S OWN PAGE NO. 23 S3

```
P0728   DUMMY MOON POSITION ROUTINE, SUN POSITION ROUTINE, AND PBODY TABLE FOR CHECKOUT OF EARTH-ORBITAL ONLY.
 0730                       07,3735  43575 1  MOONPOS  VLOAD   ITCQ          LOAD CONSTANT VECTOR INTO A AND EXIT.
 0731   REF   1             07,3736  17744 0                   MOONVEC
 0732                       07,3737  77201 1  SUNPOS   SETPD   VLOAD         RETURNS WITH VECTOR IN VAC AND IN PDL.
 0733                       07,3740  00001 0                   0
 0734   REF   1             07,3741  17747 0                   SUNVEC
 0735                       07,3742  77616 0          ITCQ
 0736                       07,3743  00006 1  EARTHTAB 2DEC    6
 0737                       07,3744  00000 1          2DEC    0.0
C0737                       07,3745  00000 1
 0738                       07,3746  00012 1          2DEC    10
 0739                       07,3747  00000 1          2DEC    0.0
C0739                       07,3750  00000 1
 0740                       07,3751  00000 1          2DEC    0.0
C0740                       07,3752  00000 1
 0741                       07,3753  77743 1          2DEC    -28           28                    3/2
 0742                       07,3754  24214 0          2DEC    .633E627      400/SQRT(MU)
C0742                       07,3755  11244 0
 0743   REF   4 LAST 776             07,3743  MOONVEC  EQUALS  EARTHTAB
 0744   REF   5 LAST 798             07,3746  SUNVEC   EQUALS  EARTHTAB +3  ******
```

L LMP COMMAND ROUTINES USER'S OWN PAGE NO. 1 S3

R0001 THE FOLLOWING SUBROUTINES ALLOW MISSION PROGRAMS TO REQUEST LMP (LEM MISSION PROGRAMMER) OUTPUTS.
R0003 THE PROPER DECIMAL CODE IS ENTERED INTO A TABLE AND FROM THENCE TO CHANNEL 10 VIA T4RUPT AND ARE INCLUDED IN
R0005 THE DOWNLINK.

R0006 FOUR ROUTINES ARE PROVIDED:

```
A0007                                   TC      1LMP            CALLED UNDER EXEC OR RUPT. DELIVERS CODE
A0008                                   DEC     LMPCODE         AND RETURNS IMMEDIATELY.

A0009                                   TC      2LMP            SAME AS 1LMP BUT TWO CODES ARE
A0010                                   DEC     LMPCODE1        SENT.
A0011                                   DEC     LMPCODE2

A0012                                   TC      1LMP+DT         ASSUMES CALLED AS PART OF WAITLIST TASK.
A0013                                   DEC     LMPCODE         DELIVERS LMP CODE, DOES A VARDELAY FOR
A0014                                   DEC     DT              DT, AND THEN RETURNS UNDER WL CONTROL.

A0015                                   TC      2LMP+DT         SAME AS 1LMP+DT BUT TWO CODES SENT.
A0016                                   DEC     LMPCODE1
A0017                                   DEC     LMPCODE2
A0018                                   DEC     DT
```

R00185 WARNING ***** PROGRAMS UNDER EXEC WHICH CALL 1LMP + 2LMP MUST FIRST

R00186 INHIBIT INTERRUPT....RETURNS STILL INHIBITED.

```
0019                            5052            BLOCK   02
0020  REF 212 LAST 761    5052  50 002 0  2LMP  INDEX   Q
0021                      5053  3 0000 1        CA      0               PICK UP 1ST CODE
0022  REF 213 LAST 799    5054  24 002 0        INCR    Q
0023  REF 214 LAST 799    5055  22 002 0        LXCH    Q               SAVE 2ND CODE ADDRESS IN L

00231                        0002  LMPGROUP EQUALS 2
00232  REF   1               1115  LMPTBASE EQUALS TBASE2
00233  REF   1               1102  LMPPHASE EQUALS PHASE2

0024  REF   3 LAST 571  5056  0 5063 1        TC      STORCOM -1      TO STORE IN BUFFER AND UPDATE POINTER

0025  REF 215 LAST 799    5057  22 002 0        LXCH    Q               RETREIVE 2ND CODE ADDRESS FROM --

0026  REF 216 LAST 799    5060  50 002 0  1LMP  INDEX   Q
0027                      5061  3 0000 1        CA      0               GET LMP CODE
0028  REF 217 LAST 799    5062  24 002 0        INCR    Q               SET RETURN.
0029  REF  35 LAST 561    5063  6 7745 0        AD      BIT15           SET SIGN TO SHOW NEW COMMAND IN BUFFER
0030  REF   4 LAST 337    5064  51'143 0 STORCOM INDEX  LMPIN
0031  REF  22 LAST 337    5065  55'133 0        TS      LMPCMD          INSERT IN NEXT SLOT IN BUFFER

0032  REF   5 LAST 799    5066  11'143 1 JPLMPIN CCS    LMPIN           UPDATE POINTER
```

L LMP COMMAND ROUTINES USER'S OWN PAGE NO. 2 S3

```
0033                          5067  1 5071 0          ICF     +2
0034  REF  14 LAST 543       5070  3 7765 1          CAF     SEVEN
0035  REF   6 LAST 799       5071  55'143 1          TS      CMPIN
0036  REF 218 LAST 799       5072  0 0002 0          TC      Q

0037  REF 219 LAST 800       5073  50 002 0  2LMP+DT INDEX   Q
0038                          5074  3 0000 1          CA      0           PICK UP 1ST CODE
0039  REF 220 LAST 800        5075  24 002 0          INCR    Q
0040  REF 221 LAST 800        5076  22 002 0          LXCH    Q           2ND CODE ADDRESS IN L.

0041  REF   4 LAST 799        5077  0 5063 1          TC      STORCOM -1  STORE IN BUFFER AND UPDATE POINTER

0042                          5100  1 5102 0          TCF     +2

0043                          5101  0 0006 1  1LMP+DT EXTEND              SAVE RETURN FOR RESTARTS
0044  REF   1                 5102  23'146 0          QXCH    LMPRET      IS LXCH IF FROM ABOVE
0045  REF  15 LAST 314        5103  3 0006 1          CA      BBANK
0046  REF   1                 5104  55'147 0          TS      LMPBANK

0047                          5105  0 0006 1          EXTEND
0048  REF   2 LAST 800        5106  5 1146 0          INDEX   LMPRET
0049                          5107  3 0001 0          DCA     0           PICK UP CODE AND DT
0050  REF   5 LAST 800        5110  0 5063 1          TC      STORCOM -1  GO TO STORE CODE AND UPDATE POINTER

0051  REF   1                 5111  23'150 1          LXCH    SAVDT       SAVE FOR RESTART
0052  REF 105 LAST 775        5112  0 4161 0          TC      PHASCHNG    RESTART PROTECT DELAY
0053                          5113   47012 1          DCT     47012
0054  REF   2 LAST 800        5114   76627 0          =GENADR SAVDT
00545 REF   2 LAST 799                E2              EBANK=  TBASE2
0055                          5115   05123 1          2CADR   LMPRST
C0055 REF   1                 5116   04062 1
0056  REF   3 LAST 800        5117  3 1150 1          CA      SAVDT       WAIT DT SECONDS
0057  REF   5 LAST 141        5120  0 5704 1          TC      VARDELAY

0058  REF   3 LAST 800        5121  51'146 0  LMPEXIT INDEX   LMPRET
0059                          5122  0 0002 0          TC      2

0060  REF   2 LAST 800        5123  3 1147 1  LMPRST  CA      LMPBANK     LMP+DT RESTARTS COME HERE
0061  REF  16 LAST 800        5124  54 006 0          TS      BBANK       AFTER DELAY.
0062  REF   1                 5125  0 5121 0          TC      LMPEXIT
```

L AS206 MISSION SCHEDULING PACKAGE USER'S OWN PAGE NO. 1 53

```
R0001           THE FOLLOWING ROUTINES IMPLEMENT THE MISSION SCHEDULING LOGIC AS DESCRIBED IN CHAPTER 4 OF THE
R0003   AS206 OPERATIONS PLAN. THE FOLLOWING ROUTINE IS ENTERED ONCE EACH SECOND FOR MOST OF THE DURATION OF THE
R0005   FLIGHT, ONCE LIFT-OFF HAS OCCURRED. AN EXCEPTION TO THIS IS THE TIME-CRI

R0006   RESTART  GROUP  FOR MISSION SCHEDULING PACKAGE IS GROUP 3.

 0007                                    31,2000          BANK   31
 0008   REF   6 LAST 335                    E2           EBANK= MTIMER4

 0009   REF  35 LAST 687      31,2000  3 6311 1  MMAINT  CAF    THREE        LOOP TO PROCESS ALL FOUR TIMERS.
 0013   REF  40 LAST 774      31,2001  54 070 1  MLOOP   TS     RUPTREG1

 0014   REF 294 LAST 761      31,2002  50 000 1          INDEX  A            LOOK AT TIMER.
 0015   REF   7 LAST 801      31,2003  11'164 1          CCS    MTIMER4
 0016   REF   1               31,2004  1 2010 0          TCF    MCOUNT       PNZ - ACTIVE AND COUNTING DOWN.
 0017   REF   1               31,2005  1 2055 1          TCF    MDUE         +0 - MISSION PHASE DUE.
 0018   REF 153 LAST 741      31,2006  6 7763 1          AD     ONE          NNZ - FREE BUT LOADED BY GROUND.
 0019                         31,2007  4 0000 0          COM                 -0 - FREE.
 0020   REF  41 LAST 801      31,2010  50 070 0  MCOUNT  INDEX  RUPTREG1     PLACE UPDATED TIMERS AND PHASE REGISTERS
 0021   REF   1               31,2011  55'174 0          TS     MTIMER4T     INTO COPY BUFFER FOR RESTART PROTECTION.

 0026   REF  42 LAST 801      31,2012  10 070 1  MDUERET CCS    RUPTREG1
 0027   REF   1               31,2013  1 2001 0          TCF    MLOOP

 0028   REF   1               31,2014  11'201 1  MCHKST  CCS    STATECTR     SEE IF POSSIBLY TIME FOR INTERVAL STATE
 0029   REF   1               31,2015  1 2034 0          TCF    MSTATEOK     VECTOR EXTRAPOLATION.

 0030   REF  36 LAST 801      31,2016  3 6311 1          CAF    THREE        IF SO, DO UPDATE UNLESS WE ARE WITHIN 16
 0031   REF  43 LAST 801      31,2017  54 070 1  MSTATECK TS     RUPTREG1     SECONDS OF THE INITIATION OF ANY MISSION
 0032   REF   2 LAST 210      31,2020  4 5343 1          CS     LOW4         PHASE.
 0033   REF  44 LAST 801      31,2021  50 070 0          INDEX  RUPTREG1
 0034   REF   8 LAST 801      31,2022  7 1164 1          MASK   MTIMER4
 0035                         31,2023  0 0006 1          EXTEND
 0036   REF   2 LAST 801      31,2024  1 2033 1          BZF    MSTATEOK -1  BRANCH IF PHASE DUE WITHIN 16 SECS.

 0037   REF  45 LAST 801      31,2025  10 070 1          CCS    RUPTREG1
 0038   REF   1               31,2026  1 2017 1          TCF    MSTATECK

 0039   REF   1               31,2027  3 5633 1          CAF    PRIO5
 0040   REF  26 LAST 764      31,2030  0 5516 0          TC     FINDVAC      TO DO THE INTEGRATION.
 0041   REF 146 LAST 773                    E4           EBANK= TDEC
 0042                         31,2031   02247 1          2CADR  STATEINT
C0042   REF   1               31,2032   16064 1
 0043   REF   1               31,2033  3 5204 1  -1      CAF    STATECRI
 0044   REF   2 LAST 801      31,2034  55'201 1  MSTATEOK TS     STATECTR

 0045   REF 106 LAST 800      31,2035  0 4161 0          TC     PHASCHNG
 0046                         31,2036   00113 1          OCT    00113

 0047   REF   1               31,2037  3 2054 1  REDO3.11 CAF    1SEC
```

L AS206 MISSION SCHEDU-ING PACKAGE USER'S OWN PAGE NO. 2 S3 E2

```
 0048   REF 116 LAST 765     31,2040  0 5663 1          TC     WAITLIST
 0049   REF   9 LAST 801                 E2             EBANK= MTIMER4
 0050                       31,2041    02000 0          2CADR  MMAINT
C0050   REF   2 LAST  66     31,2042    62062 1
 0051                       31,2043  0 0006 1          EXTEND
 0052   REF   2 LAST 801     31,2044  3 1175 0          DCA    MTIMER4T
 0053   REF  10 LAST 802     31,2045  53,165 0          DXCH   MTIMER4
 0054                       31,2046  0 0006 1          EXTEND
 0055   REF   3 LAST 802     31,2047  3 1177 1          DCA    MTIMER4T +2
 0056   REF   4 LAST 335     31,2050  53,167 1          DXCH   MTIMER2

00565   REF 107 LAST 801     31,2051  0 4161 0          TC     PHASCHNG
00566                       31,2052    40133 1          OCT    40133

 0057   REF 104 LAST 765     31,2053  0 5727 0          TC     TASKOVER

 0081                       31,2054    00144 0  1SEC    DEC    100
```

L AS206 MISSION SCHEDULING PACKAGE USER'S OWN PAGE NO. 3 S3 E2

P0082 THE FOLLOWING CODING DISPATCHES DUE MISSION PHASES VIA A TABLE OF EXECUTIVE PRIORITIES AND 2CADRS.

```
0084   REF  46 LAST 801     31,2055   3 0070 0  MDUE     CA      RUPTREG1
0085   REF   1             31,2056   55'200 0            TS      MDUETEMP       COPY FOR RESTART PROTECTION

0086   REF  47 LAST 803     31,2057   50 070 0            INDEX   RUPTREG1       GET NUMBER OF NEW PHASE AND MP BY NUMBER
0087   REF   4 LAST 335     31,2060   3 1170 0            CA      MPHASE4        OF TABLE ENTRIES PER PHASE TO GET ADDRES
0088                        31,2061   0 0006 1            EXTEND                 OF TABLE ENTRY FOR THIS PHASE.
0089   REF   1             31,2062   1 2410 1            BZF     BADPHASE       INACTIVE MPHASE HERE IS VERY BAD.
0090   REF   9 LAST 709     31,2063   54 764 0            TS      PHASENUM       HOLDS CURRENT MP NUMBER FOR DOWNLINK
0091                        31,2064   0 0006 1            EXTEND
0092   REF  37 LAST 801     31,2065   7 6311 0            MP      THREE
0093   REF 148 LAST 754     31,2066   50 001 0            INDEX   L
0094   REF   1             31,2067   3 2333 0            CA      MTABLE         PRIO, INHIBIT/ENABLE INFO., ETC.
0095   REF  34 LAST 508     31,2070   54 071 0            TS      RUPTREG2
0096   REF  15 LAST 800     31,2071   7 7765 0            MASK    SEVEN          HONOR INHIBIT/ENABLE FUNCTION.
0097   REF  19 LAST 761     31,2072   7 0076 1            MASK    FLAGWRD2
0098   REF 295 LAST 801     31,2073   10 000 0            CCS     A
0099   REF   1             31,2074   1 2117 0            TCF     MBYPASS

0103   REF   8 LAST 759     31,2075   3 5660 1            CAF     PRIO37
0104   REF  35 LAST 803     31,2076   7 0071 0            MASK    RUPTREG2
0105   REF   2 LAST 683     31,2077   54 063 0            TS      NEWPRIO
0106                        31,2100   0 0006 1            EXTEND
0107   REF 149 LAST 803     31,2101   5 0001 0            INDEX   L              PICK UP 2CADR AND DO FINDVAC.
0108   REF   2 LAST 803     31,2102   3 2335 0            DCA     MTABLE +1
0109   REF   2 LAST 684     31,2103   0 5526 0            TC      SPVAC

010905 REF  45 LAST 763     31,2104   0 4141 1            TC      2PHSCHNG
01091                       31,2105    00032 0            DCT     32             2.3 SPOT FOR REDOMDUE
010915                      31,2106    00003 1            DCT     3              GROUP 3 OFF

01092  REF   1             31,2107   0 2121 1  MTIMEDWN  TC      MTIMEFIX

0110   REF   9 LAST 744     31,2110   3 5210 1            CAF     PRIO30
0111   REF  26 LAST 759     31,2111   0 5505 1            TC      NOVAC
0112   REF  11 LAST 802                   E2             EBANK=  MTIMER4
0113                        31,2112    02145 0            2CADR   JPDATKIL
C0113  REF   1             31,2113    62062 1
0114   REF   9 LAST 775     31,2114   0 6076 0            TC      FLAG2DWN
0115                        31,2115    00020 0            DCT     20

01185  REF 105 LAST 802     31,2116   0 5727 0            TC      TASKOVER

01187  REF   2 LAST 803     31,2117   0 2121 1  MBYPASS   TC      MTIMEFIX
01189  REF   1             31,2120   1 2012 1            TCF     MDUERET

0119   REF 233 LAST 757     31,2121   4 7767 1  MTIMEFIX  CS      ZERO
0120   REF   2 LAST 803     31,2122   51'200 1            INDEX   MDUETEMP       MAKE THIS MTIMER/MPHASE PAIR AVAILABLE.
0121   REF  12 LAST 803     31,2123   55'164 1            TS      MTIMER4
```

L AS206 MISSION SCHEDULING PACKAGE USER'S OWN PAGE NO. 4 S3 E2

```
01215  REF   3 LAST 803     31,2124  51'200 1        INDEX  MDJETEMP
01217  REF   5 LAST 803     31,2125  55'170 1        TS     MPHASE4
0122   REF   4 LAST 804     31,2126  51'200 1        INDEX  MDJETEMP
01225  REF   4 LAST 802     31,2127  55'174 0        TS     MTIMER4T
01227  REF 222 LAST 800     31,2130  0 0002 0        TC     Q
```

L AS206 MISSION SCHEDULING PACKAGE USER'S OWN PAGE NO. 5 S3 E2

P0123 RESTART ROUTINE TO RESCHEDULE MISSION PHASE

```
0124  REF  10 LAST 803   31,2131  3 0764 1  REDOMDJE  CA      PHASENUM     FIND PRIO AND 2CADR OF NEW MP IN TABLE.
0125                     31,2132  0 0006 1            EXTEND
0126  REF  38 LAST 803   31,2133  7 6311 0            MP      THREE
0128  REF 150 LAST 803   31,2134  50 001 0            INDEX   L
0129  REF   3 LAST 803   31,2135  3 2333 0            CA      MTABLE
0130  REF   9 LAST 803   31,2136  7 5660 0            MASK    PRIO37
0131  REF   3 LAST 803   31,2137  54 063 0            TS      NEWPRIO
0132                     31,2140  0 0006 1            EXTEND
0133  REF 151 LAST 805   31,2141  5 0001 0            INDEX   L
0134  REF   4 LAST 805   31,2142  3 2335 0            DCA     MTABLE +1
0135  REF   3 LAST 803   31,2143  0 5526 0            TC      SPVAC        DO FINDVAC WITH 2CADR IN A + L
0136  REF   1            31,2144  1 2107 1            TCF     MTIMEDWN
```

R0137 DO A PSEUDO VERB 34 ENTER TO KILL AN UPDATE IN PROGRESS, AND TO RELEASE THE DSKY.

```
0139  REF   1            31,2145  3 2373 1  JPDATKIL  CAF     34OCT
0140  REF  10 LAST 283   31,2146  54 304 1            TS      REQRET
0141  REF 129 LAST 765   31,2147  0 5206 0            TC      BANKCALL
0142  REF   9 LAST 288   31,2150   12314 1            CADR    JPDATVB -1

0143  REF  44 LAST 757   31,2151  0 5225 1            TC      POSTJUMP
0144  REF   3 LAST 311   31,2152   11333 1            CADR    VBTERM       GOES TO ENDOFJOB WHEN DONE
```

L AS206 MISSION SCHEDULING PACKAGE USER'S OWN PAGE NO. 6 S3 E2

P0145 THE FOLLOWING SUBROUTINE MAY BE USED BY MISSION PROGRAMS TO SET MISSION PHASE/TIMER PAIRS TO INITIATE
R0147 THE VARIOUS MISSION PHASES (SEE CHAPTER 4 OF THE GSOP).

R0148 CALLING SEQUENCE IS AS FOLLOWS:

```
A0149                                          TC      MPENTRY         UNDER CONTROL OF EXEC OR RUPT.
A0150                                          DEC     INDEX           INDEX OF TIMER (1 TO 4).
A0151                                          DEC     PHASE           MISSION PHASE NUMBER.
A0152                                          ADRES   DT              DT = TIME (SECONDS) TO INITIATION.
A0153                                                                  (EBANK MUST ALREADY BE SET.)

 0154                                  5126              BLOCK   02
 0155                          5126  0 0004 0  MPENTRY   INHINT
 0156  REF 223 LAST 804       5127  50 002 0            INDEX   2          MAKE INTERNAL INDEX.
 0157                          5130  4 0000 0            CS      0
 0158  REF  23 LAST 745       5131  6 7761 0            AD      FOUR
 0159  REF  48 LAST 803       5132  54 070 1            TS      RUPTREG1

 0160  REF 236 LAST 803       5133  50 000 1            INDEX   A          IF THIS MISSION PHASE REGISTER IS NOT
 0161  REF   6 LAST 804       5134  11'170 1            CCS     MPHASE4    =0, IT HAS BEEN CHANGED BY THE GROUND,
 0162  REF   1                 5135  1 5144 1            TCF     MENTRYT    SO LEAVE IT ALONE.
 0163  REF   2 LAST 806       5136  1 5144 1            TCF     MENTRYT
 0164  REF   3 LAST 806       5137  1 5144 1            TCF     MENTRYT

 0165  REF 224 LAST 806       5140  50 002 0            INDEX   2
 0166                          5141  3 0001 0            CAF     1
 0167  REF  49 LAST 806       5142  50 070 0            INDEX   RUPTREG1
 0168  REF   7 LAST 806       5143  55'170 1            TS      MPHASE4

 0169  REF  50 LAST 806       5144  50 070 0  MENTRYT   INDEX   RUPTREG1   IF THE TIMER IS =0, SET IT TO THE INPUT
 0170  REF  13 LAST 803       5145  11'164 1            CCS     MTIMER4    VALUE, OTHERWISE, ASSUME IT HAS BEEN
 0171  REF 154 LAST 801       5146  6 7763 1            AD      ONE        SET BY THE GROUND AND JUST FORCE IT POS.
 0172  REF   1                 5147  1 5155 1            TCF     MENTABS
 0173                          5150  1 5146 0            TCF     -2

 0174  REF 225 LAST 806       5151  50 002 0            INDEX   2
 0175                          5152  3 0002 0            CAF     2
 0176  REF 237 LAST 806       5153  50 000 1            INDEX   A
 0177                          5154  3 0000 1            CA      0
 0178  REF  51 LAST 806       5155  50 070 0  MENTABS   INDEX   RUPTREG1
 0179  REF  14 LAST 806       5156  55'164 1            TS      MTIMER4

 0180  REF  39 LAST 805       5157  3 6311 1            CAF     THREE      MAKE UP RETURN SO COMMON ROUTINE CAN BE
 0181  REF 226 LAST 806       5160  6 0002 0            AD      2          USED TO INITATE TIMER COUNTING.
 0182  REF   1                 5161  55'207 1  -1        TS      MRETURN
```

L AS206 MISSION SCHEDULING PACKAGE USER'S OWN PAGE NO. 7 S3 E2

P0183 SUBROUTINE TO START MISSION TIMERS IF THEY ARE NOT GOING ALREADY.

```
0184   REF  20 LAST 803      5162  3 0076 0  MSTART   CA     FLAGWRD2     SEE IF TIMERS ENABLED ALREADY.
0185   REF  28 LAST 596      5163  7 7757 1           MASK   BIT5
0186   REF 298 LAST 806      5164  10 000 0           CCS    A
0187   REF   1               5165  1 5202 0           TCF    MDONE        YES - RETURN.

0188                         5166  1 5171 1           TCF    +3           THERE USED TO BE A PHASE CHANGE HERE.
0189   REF  40 LAST 635      5167  0 4736 1           TC     CCSHOLE
0190   REF  41 LAST 807      5170  0 4736 1           TC     CCSHOLE

0191   REF   7 LAST 771      5171  0 6060 1           TC     FLAGUP       SHOW TIMERS ENABLED.
0192                         5172   00020 0           OCT    20

0193                         5173  0 0004 0           INHINT

0197   REF   2 LAST 801      5174  3 5204 1           CAF    STATECRI     INITIALIZE STATE VECTOR EXTRAPOLATION
0198   REF   3 LAST 801      5175  55'201 1           TS     STATECTR     TIMER.

0199   REF 155 LAST 806      5176  3 7763 1           CAF    ONE
0200   REF 117 LAST 802      5177  0 5663 1           TC     WAITLIST
0201   REF  15 LAST 806                E2            EBANK= MTIMER4
0202                         5200   02000 0           2CADR  MMAINT        START COUNTER MAINTENANCE.
C0202  REF   3 LAST 802      5201   62062 1
0203                         5202  0 0003 1  MDONE    RELINT
0204   REF   2 LAST 806      5203  0 1207 0           TC     MRETURN

0205                         5204   01033 0  STATECRI DEC    539          CALLS FOR INTEGRATION EVERY 539 SEC.
0206                         5205   00145 1  1SEC+1   DEC    101
```

L AS206 MISSION SCHEDULING PACKAGE USER'S OWN PAGE NO. 8 53 E2

P0207 SUBROUTINE CALLS FOR VARIOUS UPDATE OPTIONS (SEE GSOP). ENTER UNDER EXEC WITH INTERRUPT INHIBITED.

```
0209                                  31,2153                 BANK    31
0210  REF   1                 31,2153 0 2265 1  DOV70         TC      MTIMERUP        VERB 70
0211  REF   2 LAST 327       31,2154 1 2351 0                 TCF     ENDJP

0212  REF   1                 31,2155 0 2221 1  DOV71         TC      MPHASEUP        VERB 71
0213  REF   2 LAST 325       31,2156 1 2161 1                 TCF     DOV72 +2

0214  REF   2 LAST 808       31,2157 0 2221 1  DOV72         TC      MPHASEUP        VERB 72
0215  REF   2 LAST 808       31,2160 0 2265 1                 TC      MTIMERUP
0216  REF   3 LAST 325       31,2161 3 1202 0  +2            CA      JPPHASE         FOR V72, WE DON'T ALTER THE MPHASE
0217  REF  52 LAST 806       31,2162 50 070 0                 INDEX   RJPTREG1       REGISTER UNTIL SURE THAT TIMER CHANGE
0218  REF   8 LAST 806       31,2163 55*170 1                 TS      MPHASE4         IS LEGAL.
0219  REF   3 LAST 808       31,2164 1 2351 0  TCFENDJP      TCF     ENDJP
```

```
L       AS206 MISSION SCHEDULING PACKAGE                                USER'S OWN PAGE NO.  9          S3  E2

P0221   INVERT INHIBIT/ENABLE SWITCH WHOSE INDEX IS IN UPINDEX (1 TO 3).  ENTER UNDER EXEC WITH INTERRUPT INHIBITED.

0223    REF  90 LAST 745    31,2165  4 7762 1  DOV73   CS      TWO
0224    REF   7 LAST 325    31,2166  6 1204 0          AD      UPINDEX
0225    REF   9 LAST 185    31,2167  0 4323 1          TC      MAGSUB          SEE IF INDEX LEGIT.
0226                        31,2170    77776 1         DEC     -1
0227    REF   1             31,2171  1 2356 1          TCF     UPERROR

0228    REF   8 LAST 809    31,2172  51,204 0          INDEX   UPINDEX
0229    REF  22 LAST 687    31,2173  3 7760 1          CAF     BIT3 -1         BITS IN POSITIONS 3, 2, AND 1 OF
0230    REF 152 LAST 805    31,2174  54 001 1          TS      L               FLAGWRD2 (SEE SWITCH ASSIGNMENTS).
0232    REF  21 LAST 807    31,2175  3 0076 0          CA      FLAGWRD2
0233                        31,2176  0 0006 1          EXTEND
0234    REF 153 LAST 809    31,2177  06 001 0          RXOR    L
0235    REF  22 LAST 809    31,2200  54 076 1          TS      FLAGWRD2
0236    REF   4 LAST 808    31,2201  1 2351 0          TCF     ENDUP

R0237           THE FOLLOWING CODING ISSUES THE SINGLE LMP COMMAND FOUND IN UPINDEX PROVIDED THE TIMERS ARE ENABLED
R0239   (NON TIME CRITICAL PHASE OF MISSION).

0240    REF  23 LAST 809    31,2202  4 0076 1  DOV67   CS      FLAGWRD2
0241    REF  29 LAST 807    31,2203  7 7757 1          MASK    BIT5
0242    REF 299 LAST 807    31,2204  10 000 0          CCS     A
0243    REF   2 LAST 809    31,2205  1 2356 1          TCF     UPERROR

0244    REF  25 LAST 761    31,2206  4 7754 1          CS      BIT8            COMMAND MUST BE BETWEEN 1 AND 255.
0245    REF   9 LAST 809    31,2207  6 1204 0          AD      UPINDEX
0246    REF  10 LAST 809    31,2210  0 4323 1          TC      MAGSUB
0247                        31,2211    77600 1         DEC     -127
0248    REF   3 LAST 809    31,2212  1 2356 1          TCF     UPERROR

0249    REF   1             31,2213  3 2220 0          CAF     TC1LMP
0250    REF  10 LAST 809    31,2214  55,203 0          TS      UPINDEX -1
0251    REF   1             31,2215  3 2164 0          CAF     TCFENDUP
0252    REF  11 LAST 809    31,2216  55,205 0          TS      UPINDEX +1
0253    REF  12 LAST 809    31,2217  0 1203 1          TC      UPINDEX -1

0254    REF  20 LAST 765    31,2220  0 5060 1  TC1LMP  TC      ILMP            FOR ERASABLE CALL.
```

L AS206 MISSION SCHEDULING PACKAGE USER'S OWN PAGE NO. 10 S3 E2

```
P0255           THE FOLLOWING CODING UPDATES A MISSION PHASE NUMBER WHOSE INDEX IS IN UPINDEX TO THE VALUE FOUND
R0257   IN UPPHASE. RETURN IS TO CALLER IF DATA OK, OR TO UPERROR IF DATA OUT OF RANGE.

 0259   REF 227 LAST 806     31,2221  3 0002 0  MPHASEJP  CA    Q
 0260   REF   1              31,2222  0 2250 1            TC    CHKINDEX        CHECK INDEX VALUE AND MAKE INTERNAL NDX.

 0261   REF   4 LAST 808     31,2223  11,202 1            CCS   UPPHASE         CHECK ON SIZE OF PHASE.
 0262                        31,2224  1 2230 0            TCF   +4
 0263   REF   4 LAST 809     31,2225  1 2356 1            TCF   UPERROR
 0264   REF   5 LAST 810     31,2226  1 2356 1            TCF   UPERROR
 0265   REF   6 LAST 810     31,2227  1 2356 1            TCF   UPERROR

 0266   REF  11 LAST 809     31,2230  0 4323 1  +4        TC    MAGSUB
 0267                        31,2231   77756 0            OCT   -21             ALLOW PHASES 1 - 18D ONLY.
 0268   REF   7 LAST 810     31,2232  1 2356 1            TCF   UPERROR         FOR BAD RETURN FROM MAGSUB
 0269   REF   5 LAST 810     31,2233  4 1202 1            CS    UPPHASE         CHECK LEGALITY OF UPPHASE
 0270   REF  18 LAST 709     31,2234  6 6306 1            AD    SIX
 0271   REF 300 LAST 809     31,2235  10 000 0            CCS   A
 0272   REF   8 LAST 810     31,2236  1 2356 1            TCF   UPERROR
 0273                        31,2237   72400 0  MPLEGAL   OCT   72400           BITS 15 - 1 = 1 FOR MP 7 - 21 LEGAL
 0274                        31,2240  1 2242 0            TCF   +2
 0275   REF   9 LAST 810     31,2241  1 2356 1            TCF   UPERROR

 0276   REF 301 LAST 810     31,2242  50 000 1            INDEX A
 0277   REF  36 LAST 799     31,2243  3 7745 0            CA    BIT15
 0278   REF   1              31,2244  7 2237 1            MASK  MPLEGAL
 0279                        31,2245  0 0006 1            EXTEND
 0280   REF  10 LAST 810     31,2246  1 2356 1            BZF   UPERROR

 0281   REF   3 LAST 807     31,2247  0 1207 0            TC    MRETURN

R0285   MINOR SUBROUTINE TO CHECK MISSION TIMER/PHASE UPDATE INDEX AND LEAVE CORRESPONDING VALUE IN RUPTREG1.

R0287   TO BE ENTERED WITH INTERRUPT INHIBITED:

 0288   REF   4 LAST 810     31,2250  55,207 1  CHKUPDEX  TS    MRETURN         CALLER'S RETURN ARRIVES IN A.
 0289   REF  13 LAST 809     31,2251  11,204 1   +1       CCS   UPINDEX
 0290                        31,2252  1 2256 0            TCF   +4
 0291   REF  11 LAST 810     31,2253  1 2356 1            TCF   UPERROR
 0292   REF  12 LAST 810     31,2254  1 2356 1            TCF   UPERROR
 0293   REF  13 LAST 810     31,2255  1 2356 1            TCF   UPERROR

 0294   REF   3 LAST 418     31,2256  7 5340 1  +4        MASK  NEG3
 0295   REF 302 LAST 810     31,2257  10 000 0            CCS   A
 0296   REF  14 LAST 810     31,2260  1 2356 1            TCF   UPERROR

 0297   REF  14 LAST 810     31,2261  4 1204 1            CS    UPINDEX         MAKE INTERNAL VALUE.
 0298   REF  24 LAST 806     31,2262  6 7761 0            AD    FOUR
 0299   REF  33 LAST 808     31,2263  54 070 1            TS    RUPTREG1
 0300   REF 228 LAST 810     31,2264  0 0002 0            TC    Q
```

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P0301 THE FOLLOWING CODING UPDATES THE MISSION TIMER WHOSE INDEX IS IN UPINDEX BY ADDING THE CONTENTS OF JPDT
R0303 TO IT. OUTCOMES DEPEND ON WHETHER THE TIMER WAS COUNTING AT THE TIME, AND THE SIGN OF THE RESULT (SEE GSOP).

```
0305  REF 229 LAST 810   31,2265  3 0002 0  MTIMERJP  CA     Q          GO TO COMMON SUBROUTINE TO SAVE RETURN
0306  REF   2 LAST 810   31,2266  0 2250 1            TC     CHKJPDEX   AND CHECK INDEX.
0307  REF  54 LAST 810   31,2267  50 070 0            INDEX  RUPTREG1   SEE IF TIMER IS COUNTING NOW.
0308  REF  16 LAST 807   31,2270  11'164 1            CCS    MTIMER4
0309  REF   1            31,2271  1 2276 1            TCF    TJPBUSY    POS INDICATES IT IS.
0310  REF   2 LAST 811   31,2272  1 2276 1            TCF    TJPBUSY
0311                     31,2273  1 2274 0            NOOP

0312  REF   3 LAST 325   31,2274  3 1203 1            CA     JPDT       IF NOT BUSY, LOAD WITH DT DIRECTLY, WITH
0313  REF   1            31,2275  1 2303 1            TCF    CTRABS     NO CHANGE TO THE MAINTENANCE FLAG STATE.

0316  REF   4 LAST 811   31,2276  11'203 0  TJPBUSY   CCS    JPDT       IF TIMER COUNTING, SEE IF DT ZERO.
0317  REF   1            31,2277  1 2306 1            TCF    CTRAD      NZ - DO ADD.
0318  REF   2 LAST 811   31,2300  1 2303 1            TCF    CTRABS     +0 - PHASE DUE NEXT MAINTENANCE CYCLE.
0319  REF   2 LAST 811   31,2301  1 2306 1            TCF    CTRAD

0320  REF 234 LAST 803   31,2302  4 7767 1            CS     ZERO       IF -0, DISABLE TIMER.
0321  REF  55 LAST 811   31,2303  50 070 0  CTRABS    INDEX  RUPTREG1
0322  REF  17 LAST 811   31,2304  55'164 1            TS     MTIMER4
0323  REF   5 LAST 810   31,2305  0 1207 0            TC     MRETURN

0326  REF   1            31,2306  0 2314 0  CTRAD     TC     CTRADSUB
0327  REF 303 LAST 810   31,2307  10 000 0            CCS    A          IF RESULT NEGATIVE OR ZERO, PHASE DUE
0328  REF   6 LAST 811   31,2310  0 1207 0            TC     MRETURN    NEXT MAINTENANCE CYCLE.
0329  REF   7 LAST 811   31,2311  0 1207 0            TC     MRETURN
0330  REF 235 LAST 811   31,2312  3 7767 0            CAF    ZERO
03302 REF   3 LAST 811   31,2313  1 2303 1            TCF    CTRABS     (THIS ALONE REVERTS -0 TO +0.)

03304 REF   5 LAST 811   31,2314  3 1203 1  CTRADSJB  CA     JPDT
03306 REF  56 LAST 811   31,2315  50 070 0            INDEX  RUPTREG1
03308 REF  18 LAST 811   31,2316  6 1164 0            AD     MTIMER4
0331                     31,2317  54 000 0            OVSK
03312                    31,2320  1 2322 1            TCF    +2         NO OVERFLOW (NORMAL CASE).
03314 REF  15 LAST 810   31,2321  0 2356 0            TC     UPERROR    IF OVFLO, GO TO UPERROR WITH TIMER
03315 REF  57 LAST 811   31,2322  50 070 0            INDEX  RUPTREG1   UNCHANGED.
03316 REF  19 LAST 811   31,2323  55'164 1            TS     MTIMER4
03318 REF 230 LAST 811   31,2324  0 0002 0            TC     Q
```

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```
P0332          THE FOLLOWING CODING IS THE SAME AS MTIMERUP BUT ACCEPTS DP GET IN UPGET (SEE GSOP).

 0334   REF  77 LAST 780     31,2325  0 6112 0  MGETUP   TC      INTPRET          MAKE SURE THIS ENTERED WITH VAC AREA.

 0335                        31,2326    44234 1            RTB     BDSJ             TIME IN CS.
 0336   REF   4 LAST 735     31,2327    33454 1            LOADTIME
 0337   REF   2 LAST 325     31,2330    01206 1            UPGET
 0338                        31,2331    54205 1            DMP     SL               CONVERT TO SEC & MOVE TO MAJOR PART.
 0339   REF   1              31,2332    22372 1            1/100
 0340                        31,2333    20217 1            14D
 0341                        31,2334    50004 0            BOVB    BMN
 0342   REF  16 LAST 811     31,2335    62356 0            UPERROR
 0343   REF  17 LAST 812     31,2336    62355 0            UPERROR -1       (DOES AN EXIT.)

 0344                        31,2337    77776 1            EXIT

 0345                        31,2340  0 0004 0            INHINT
 0346   REF  30 LAST 809     31,2341  3 7757 0            CA      BIT5             INSURE THAT MAINTENANCE IS STILL ENABLED
 0347   REF  24 LAST 809     31,2342  7 0076 1            MASK    FLAGWRD2
 0348                        31,2343  0 0006 1            EXTEND
 0349   REF  18 LAST 812     31,2344  1 2356 1            BZF     UPERROR

 0350   REF   3 LAST 811     31,2345  0 2251 0            TC      CHKUPDEX +1
 0351   REF 294 LAST 790     31,2346  3 0144 0            CA      MPAC             CONTAINS DT IN SECONDS.
 0352   REF  58 LAST 811     31,2347  50 070 0            INDEX   RUPTREG1
 0353   REF  20 LAST 811     31,2350  55*164 1            TS      MTIMER4          INSERT DT DIRECTLY INTO TIMER.

R0354          GENERAL EXIT LOCATION FOR SUCCESSFULLY COMPLETED UPDATE:

 0355   REF 236 LAST 811     31,2351  3 7767 0  ENDUP    CAF     ZERO             TURN OFF GROUP 6.
03552   REF   8 LAST 682     31,2352  0 4246 0            TC      NEWPHASE
03553                        31,2353    00006 1            OCT     6

03555   REF  89 LAST 775     31,2354  1 5567 1            TCF     ENDOFJOB

R0356          EXIT FOR GENERAL UPDATE ERRORS (RANGE OF DATA, ETC.)

 0357                        31,2355    77776 1  -1        EXIT

 0358   REF   5 LAST 282     31,2356  0 4571 0  UPERROR   TC      FALTON
 0359   REF   5 LAST 809     31,2357  1 2351 0            TCF     ENDUP            RELINT, & ENDOFJOB.
```

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```
P0361           THE FOLLOWING TABLE SPECIFIES STARTING LOCATIONS AND PRIORITIES OF ALL 206 MISSION PHASES INITIATED BY
R0363   THE MISSION TIMERS (S4B-LEM SEP AND BEYOND). IT ALSO CONTAINS INHIBIT/ENABLE INFORMATION, ETC. EACH ENTRY
R0365   CONSISTS OF THREE WORDS. THE FIRST IS PACKED WITH SEVERAL PIECES OF INFORMATION, AND THE SECOND TWO CONTAIN THE
R0367   2CADR OF THE LOCATION AT WHICH THE PHASE IS TO BEGIN. THE INTERPRETATION OF WORD 1 IS AS FOLLOWS:

R0369           BIT15:          SPARE
R0370           BITS 14-10:     JOB PRIORITY.
R0371           BITS 9-5:       SPARE
R0372           BIT4:           1 IF TIMERS TO BE DISABLED ON PHASE INITIATION.
R0373           BIT3:           1 IF RCS TESTS (INHIBIT/ENABLE INFO).
R0374           BIT2:                   1 IF DPS COLD SOAK
R0375           BIT1:                   1 IF RCS COLD SOAK

R0376   NOTE SPARES COULD BE USED FOR SWITCHING DOWNLISTS, ETC.

R0377           PHASES 1 - 6 ARE NOT INCLUDED SINCE THEY ARE NOT INITIATED BY THE MISSION SCHEDULING ROUTINES.
 0379                           31,2360   20010 1  MTABLE1  DCT     20010           MP7
 0380   REF 147 LAST 801                        E4          EBANK=  TDEC
 0381                           31,2361   02474 1          2CADR   MP07JOB
C0381   REF   1                31,2362   52064 1
 0382                           31,2363   20012 0          DCT     20012           MP8
 0383   REF  12 LAST 755                        E3          EBANK=  RATEINDX
 0384                           31,2364   02564 1          2CADR   MP8JOB
C0384   REF   1                31,2365   56063 1
 0385                           31,2366   20010 1          DCT     20010           MP9
 0386   REF 148 LAST 813                        E4          EBANK=  TDEC
 0387                           31,2367   02724 1          2CADR   MP9JOB
C0387   REF   1                31,2370   66064 0
 0388                           31,2371   00243 1  1/100   2DEC    0.01            MP 10.  UNUSED SLOT.
C0388                           31,2372   32703 1
 0390                           31,2373   00034 0  340CT   DCT     00034

 0391                           31,2374   20010 1          DCT     20010           MP11
 0392   REF 149 LAST 813                        E4          EBANK=  TDEC
 0393                           31,2375   02000 0          2CADR   MP11JOB
C0393   REF   1                31,2376   74064 0
 0394   REF  42 LAST 807       31,2377   0 4736 1         TC      CCSHOLE         MP 12.  UNUSED SLOT.
 0395   REF  43 LAST 813       31,2400   0 4736 1         TC      CCSHOLE
 0396   REF  44 LAST 813       31,2401   0 4736 1         TC      CCSHOLE

 0397                           31,2402   20010 1          DCT     20010           MP13
 0398   REF 150 LAST 813                        E4          EBANK=  TDEC
 0399                           31,2403   03114 0          2CADR   MP13JOB
C0399   REF   1                31,2404   56064 0
 0400   REF  45 LAST 813       31,2405   0 4736 1         TC      CCSHOLE         MP 14.  UNUSED SLOT.
 0401   REF  46 LAST 813       31,2406   0 4736 1         TC      CCSHOLE
 0402   REF  47 LAST 813       31,2407   0 4736 1         TC      CCSHOLE

 0403   REF   1                        31,2333  MTABLE   EQUALS MTABLE1 -21D      MP 1-6 NOT ACTUALLY INCLUDED IN TABLE.
```

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```
 0404   REF  39 LAST 683     31,2410  0 4755 1  BADPHASE TC     ALARM
 0405                        31,2411    00601 0             OCT    00601
 0406   REF  10 LAST 805     31,2412  3 5660 1             CAF    PRIO37
 0407   REF  27 LAST 803     31,2413  0 5505 1             TC     NOVAC
 0408   REF  33 LAST 748                   E3              EBANK= LST1
 0409                        31,2414    02007 1           2CADR  FORGETIT
C0409   REF   3 LAST 313     31,2415    16063 0
 0410   REF 106 LAST 803     31,2416  0 5727 0             TC     TASKOVER
```

ALARM WHEN MPHASE COMES DUE BUT MPHASE REGISTER IS ZERO (=0 MEANS INACTIVE).

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R0012 **SERVICER ROUTINES**

R0013 MOD NO. 00 MODIFICATION BY A. KOSMALA NOV. 1966
R0014 MOD NO. 1 MODIFICATION BY D. LICKLY JAN 1967
R0015 *FUNCTIONAL DESCRIPTION*

R0016 THE NORMAL ENTRY TO THE THRUST MISSION CONTROL PROGRAM IS THROUGH PREREAD. PREREAD SCHEDULES THE JOB
R0018 LASTBIAS. BOOST PHASE ENTERS THE PREREAD ROUTINE AT BIBIBIAS, BYPASSING THE LASTBIAS JOB. PIPS ARE CLEARED,
R0020 AVERAGE G FLAG IS SET, DRIFT FLAG IS UNSET. DV MONITOR AND FINDCUD ARE INITIALIZED, THE JOB NORMLIZE IS
R0022 SCHEDULED, AND A WAITLIST CALL IS MADE TO START READACCS IN TWO SECONDS.

R0023 NORMLIZE PERFORMS THE SCALING AND INITIALIZATION REQUIRED PRIOR TO THE FIRST ENTRY TO AVERAGE G.

R0025 IN THE READACCS SECTION, THE ACCELEROMETERS ARE READ BY THE PIPASR SUBROUTINE. IF THE AVERAGE G FLAG IS
R0027 SET, READACCS IS CALLED TO RECYCLE IN TWO SECONDS. IF THE AVERAGE G FLAG IS DOWN, AVERAGE G EXIT (AVEGEXIT)
R0029 IS SET FOR THE FINAL PASS, AND READACCS IS NOT CALLED AGAIN. IN EITHER CASE, THE SERVICER JOB IS ESTABLISHED.

R0031 THE SERVICER ROUTINE CHECKS FOR RUNAWAY PIPS (DELV GREATER THAN 3200 PULSES/SEC FOR 2 SEC) AND SENDS
R0033 ALARM CODE 205 IF BAD PIP IS FOUND. PIPS ARE COMPENSATED IN 1/PIPA SUBROUTINE, MASS IS UPDATED BY MASSMON
R0035 SUBROUTINE, AND AVERAGEG DOES THE NAVIGATION. THE AVERAGE G ROUTINE UPDATES RN, VN, AND GDT/2 VECTORS, USING
R0037 THE SUBROUTINE CALCRVG. CONTROL IS THEN TRANSFERRED TO THE MONITOR SPECIFIED BY DVSELECT. DVSELECT IS SET BY
R0039 THE BOOST PHASE TO BOOSTMON, AND BY THE ENGINEON ROUTINE TO THE PGNCSMON. USERS STARTING SERVICER BEFORE THE
R0041 ENGINE IS ON SHOULD INSURE BYPASSING DVMON INITIALLY BY SETTING DVSELECT TO THE GENADR OF AVERAGE G.

R0043 THE BOOST MONITOR (BOOSTMON) CHECKS DELV AGAINST THRSHLD+, THE THRESHOLD ACCELERATION FOR THE BOOST PHASE.
R0045 IF DELV IS BELOW THRESHOLD, INDICATING TERMINATION OF BOOST, MISSION PHASE 6 IS SCHEDULED AS A JOB, DVSELECT
R0047 IS ALTERED TO BYPASS BOOSTMON AND PROCEED DIRECTLY TO AVERAGE G.

R0048 THE PGNCS MONITOR (PGNCSMON) COMPARES ACTUAL THRUST TO THE THRESHOLD VALUE FOR THE +X ACCELERATION
R0050 (100 CM/SEC). IF THRUST IS FOUND BELOW THIS VALUE FOR 3 CYCLES (I.E., 4 TO 6 SECONDS) AS DETERMINED BY DVCNTR,
R0052 AND THE ENGINE FLAG IS REMOVED, (INDICATING THAT THE ENGINE HAS BEEN TURNED OFF) CONTROL IS BRANCHED TO THE
R0054 LOCATION SPECIFIED BY DVMNEXIT, PREVIOUSLY SET BY THE USERS PROGRAM. DVSELECT IS ALTERED TO BYPASS PNGCSMON IN
R0056 SUBSEQUENT PASSES. IF, HOWEVER, THE ENGINE FLAG IS STILL ON AT THIS TIME, CONTROL IS TRANSFERRED TO ENGNFAIL.
R0058 THIS SENDS ALARM CODE 1405 AND KILLS THAT MISSION PHASE. ANY TIME THE THRUST IS LESS THAN THE THRESHOLD VALUE,
R0060 THE STEERING IS DETACHED (NO EXIT VIA AVEGEXIT) AND EXIT IS MADE THRU SERVEXIT.

R0062 THE NORMAL EXIT IS THRU AVEGEXIT, WHICH MUST HAVE BEEN SET BY THE USER. THE FINAL EXIT, SET INTO AVEGEXIT BY
R0064 READACCS WHEN IT FINDS THE AVERAGE G FLAG DOWN, SETS UP FREE FALL GYRO COMPENSATION, SETS THE DRIFT FLAG ON,
R0066 PERFORMS AVETOMID ROUTINE, AND TRANSFERS CONTROL TO POOH, THUS CLEARING ALL ACTIVITY UNTIL A NEW MISSION
R0068 PHASE IS DUE.

R0069 ***** WARNING TO USERS *****

R0070 THE USER MUST SET DVMNEXIT TO THE 2CADR OF A JOB TO BE PERFORMED WHEN ENGINE SHUTDOWN IS DETECTED BY SERVICER.
R0072 IN GENERAL, THE AVERAGE G FLAG WILL BE TURNED OFF BY THE USER AT THAT TIME, ALLOWING JUST ONE MORE PASS THROUGH
R0074 AVERAGE G. ALL ACTIVITY OF THE USERS MISSION PHASE MUST HAVE BEEN COMPLETED BEFORE THIS LAST PASS THROUGH
R0076 AVERAGE G, DUE TO THE PERFORMANCE OF POOH AS DESCRIBED ABOVE.

R0077 AVGEXIT MUST BE SET BY THE USER TO THE 2CADR OF THE JOB (E.G., STEERING) TO BE PERFORMED AFTER EACH PASS
R0079 THROUGH AVERAGE G. IF NO OTHER JOB IS TO BE DONE, AVEGEXIT SHOULD BE SET TO SERVEXIT.

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R0081 USER MUST INITIALIZE DVSELECT TO THE SENADR OF AVERAGE G UNLESS THE ENGINEON ROUTINE HAS BEEN PERFORMED
R0083 BEFORE THE START OF SERVICER.

R0084 USERS (EXCEPT FOR BOOST PHASE) MUST PERFORM MIDTOAVE ROUTINE BEFORE STARTING PREREAD.

R0086 CALLING SEQUENCE IS NORMAL WAITLIST CALL FOR PREREAD. (READACCS WILL START TWO SECONDS LATER.)

R0088 SUBROUTINES CALLED

R0089 LASTBIAS PIPASR FLAG1UP FLAG2DWN NORMLIZE READACCS SERVICER 1/PIPA MASSMON AVERAGE G CALCRVG
R0091 PHASCHNG AVETOMID ROOM FORGETIT

R0092 NORMAL EXIT MODES .. AVEGEXIT, DVMNEXIT, TASKOVER, ENDOFJOB.

R0093 ALARM CODE 205 GIVEN IF RUNAWAY PIP. PROGRAM THEN CONTINUES IN NORMAL SEQUENCE.
R0095 ALARM CODE 1405 GIVEN IF ENGINE FAILURE IS DETECTED. PROGRAM THEN TERMINATES THE MISSION PHASE. (TO FORGETIT)

R0097 ERASABLE INITIALIZATION REQUIRED

R0098 MASS .. INITIALIZED IN ERASABLE LOAD
R0099 RAVEGON AND VAVEGON .. INITIALIZED IN ERASABLE LOAD - UPDATED BEFORE EACH CALL FOR PREREAD.

R0101 OUTPUT

R0102 DELV(6) RN(6) VN(6) GDT/2(6) CDUTEMP(6) MASS(2) DELAREA(2) PIPTIME(2) OLDBT1(1)

R0104 DEBRIS

R0105 CENTRALS .. A, L, Q

R0106 OTHER .... DVCNTR, ITEMP1, ITEMP2, RN1(6), VN1(6), GDT1/2(6), DAREATMP(2), MASSTEMP(2), PIPAGE, TEMX,

R0108 TEMY, TEMZ, TEMXY, PIPCTR

R0109 *** THRUST MISSION CONTROL IS RESTART PROTECTED AND USES RESTART GROUP 5. ***

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```
0111                                30,2000          BANK   30
0112   REF  17 LAST 751              E5               EBANK= DVCNTR
R0115  **********************************           **********************************************************
0116   REF 108 LAST 802    30,2000  0 4161 0 PREREAD  TC     PHASCHNG
0117                       30,2001  07015  1         OCT    07015
0118                       30,2002  77777  0         OCT    77777

0119   REF  18 LAST 817              F5               EBANK= DVCNTR
0120                       30,2003  02011  0         2CADR  BIBIBIAS      SKIP LASTBIAS AFTER RESTART
C0120  REF   2 LAST 676    30,2004  60065  1
0121   REF   3 LAST 166    30,2005  3 5653 1         CAF    PRIO32
0122   REF  28 LAST 814    30,2006  0 5505 1         TC     NOVAC
0123   REF   2 LAST  30              F3               EBANK= NBDX
0124                       30,2007  03575  0         2CADR  LASTBIAS      DO LAST GYRO COMPENSATION IN FREE FALL
C0124  REF   2 LAST  68    30,2010  24063  1
0125   REF   1             30,2011  0 2574 0 BIBIBIAS TC     PIPASR       CLEAR + READ PIPS LAST TIME IN FREE FALL

0126   REF   6 LAST 696    30,2012  0 6051 0         TC     FLAGUP       SET AVEG FLAG
0127                       30,2013  00001  0         OCT    1

01271  REF   3 LAST 480    30,2014  3 1337 1         CA     STARTDVC     * PLEASE DONT MOVE-DVCNTR SHOULD BE
0128   REF  10 LAST 803    30,2016  0 6076 0         TC     FLAGDOWN     KNOCK DOWN DRIFT FLAG
0129                       30,2017  40000  0         OCT    40000

0132   REF   4 LAST 708    30,2020  3 7751 0         CAF    EBANK4
0133   REF  51 LAST 748    30,2021  54 003 0         TS     EBANK
0134   REF   1                      F4               EBANK= AXIS          CORCT IS DEAD, LONG LIVE AXIS

0135   REF  44 LAST 671    30,2022  3 7746 0         CAF    BIT14        INITIALIZE AXIS TO (0.5,0,0)
0136   REF   2 LAST 817    30,2023  55,640 0         TS     AXIS         FOR FINDCDUD
0137   REF 237 LAST 812    30,2024  3 7767 0         CAF    ZERO
0138   REF   3 LAST 817    30,2025  55,641 1         TS     AXIS +1
0139   REF   4 LAST 817    30,2026  55,642 1         TS     AXIS +2
0140   REF   5 LAST 817    30,2027  55,643 0         TS     AXIS +3
0141   REF   6 LAST 817    30,2030  55,644 1         TS     AXIS +4
0142   REF   7 LAST 817    30,2031  55,645 0         TS     AXIS +5

01421  REF  91 LAST 809    30,2032  3 7762 0         CAF    TWO          DIRECT REREADAC TO READACCS IN CASE
01422  REF   1             30,2033  55,161 1         TS     PIPAGE       OF A RESTART

0143   REF   2 LAST 381    30,2034  3 5644 1         CAF    PRIO21       SET UP TO DO NORMLIZE REQUIRED PRIOR
0144   REF  27 LAST 801    30,2035  0 5516 0         TC     FINDVAC      TO FIRST ENTRY TO AVERAGE G.
0145   REF   4 LAST 772              F4               EBANK= RAVFCON
0146                       30,2036  02412  1         2CADR  NORMLIZE
C0146  REF   2 LAST  67    30,2037  60064  0
```


L 206 SERVICE ROUTINES USER'S OWN PAGE NO. 4 S3 E4

```
0148   REF 118 LAST 807    30,2041  0 5663 1         TC     WAITLIST
0149   REF  20 LAST 817              F5               EBANK= DVCNTR
0150                       30,2042  02047  0         2CADR  READACCS
C0150  REF   1             30,2043  60065  1
0152                       30,2045  40025  1         OCT    40025
```

L 206 SERVICE ROUTINES USER'S OWN PAGE NO. 5 S3 E4

```
P0154  ********************************  READACCS  ************************************************************
 0156  REF   2 LAST  69                        E5          EBANK=  NEGXDV
 0157  REF  23 LAST 633   30,2047  4 1000 1  READACCS  CS      T5ADR     TO PREVENT LOST DOWNRUPTS, ADJUST THE
01575  REF   1            30,2050  6 2125 0            AD      FILTAD    RELATIVE PHASING BETWEEN READACCS AND
 0158                     30,2051  0 0006 1            EXTEND            DAP FOR MINIMUM INTERFERENCE. THESE
01585  REF   1            30,2052  1 2060 1            BZF     WASFILT   TESTS ARE NECESSARY ONLY WHEN THE TRIM
A01587                                                                 GIMBAL IS BEING USED, BUT IT TAKES TOO
 0159  REF  24 LAST 819   30,2053  4 1000 1            CS      T5ADR     LONG TO CHECK FOR THIS SITUATION TO BE
01595  REF   1            30,2054  6 2126 0            AD      G15AD     WORTH IT.
 0160                     30,2055  0 0006 1            EXTEND
01605  REF   1            30,2056  1 2121 0            BZF     SLIPONE
 0161  REF   1            30,2057  1 2064 0            TCF     PIPREAD

01615  REF  18 LAST 633   30,2060  4 0030 0  WASFILT   CS      TIME5
 0162  REF  45 LAST 762   30,2061  6 7743 0            AD      POSMAX
01625                     30,2062  0 0006 1            EXTEND
 0163  REF   2 LAST 819   30,2063  1 2121 0            BZF     SLIPONE

 0164  REF   2 LAST 817   30,2064  0 2574 0  PIPREAD   TC      PIPASR

 0165                     30,2065  0 0006 1  PIPSDONE  EXTEND            SUPER HIGH-SPEED PHASE CHANGE TO
 0166  REF   1            30,2066  3 2130 1            DCA     5.31SFT   MINIMIZE THE TIME SPENT IN THE READACCS
 0167  REF   1            30,2067  53110 1            DXCH    -PHASE5   TASK.

 0168  REF  92 LAST 817   30,2070  3 7762 0  RED05.31  CAF     TWO       SHOW PIPS HAVE BEEN READ FOR REREADAC.
 0169  REF   2 LAST 817   30,2071  55161 1            TS      PIPAGE

 0170  REF  26 LAST 716   30,2072  4 0075 1  CHEKAVEG  CS      FLAGWRD1
 0171  REF  51 LAST 771   30,2073  7 7763 0            MASK    BIT1
 0172  REF 304 LAST 811   30,2074  10 000 0            CCS     A         IF AVEG FLAG DOWN SET FINAL EXIT AVEG
 0173  REF   1            30,2075  0 2116 0            TC      AVEGOUT

 0174  REF   2 LAST 817   30,2076  3 2235 1            CAF     2DECSEC   READ PIPS AT 2 SECOND INTERVALS
 0175  REF 119 LAST 818   30,2077  0 5663 1            TC      WAITLIST
 0176  REF   2 LAST  68                  E5          EBANK=  BMEMORY
 0177                     30,2100    02047 0          2CADR   READACCS
C0177  REF   2 LAST 818   30,2101    60065 1
 0178  REF   7 LAST 721   30,2102  3 7746 0  MAKESERV  CAF     PRIO30    ESTABLISH SERVICER ROUTINE
 0179  REF  28 LAST 817   30,2103  0 5516 0            TC      FINDVAC
 0180  REF   3 LAST 819                  F5          EBANK=  BMEMORY
 0181                     30,2104    02133 1          2CADR   SERVICER
C0181  REF   2 LAST  68   30,2105    60065 1
 0182                     30,2106  0 0006 1            EXTEND            HIGH SPEED PHASE CHANGE.
01823  REF   1            30,2107  3 2132 0            DCA     5.6SET    5.6 FOR REREADAC TASK & SERVICER JOB.
01826  REF   2 LAST 819   30,2110  53110 1            DXCH    -PHASE5
 0183  REF  17 LAST 747   30,2111  4 0025 1            CS      TIME1     SET TBASE.
01833  REF   2 LAST 680   30,2112  55123 1            TS      TBASE5

 0184  REF 108 LAST 818   30,2113  1 5727 1            TCF     TASKOVER  END PREVIOUS READACCS WAITLIST TASK
```

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```
 0185  REF   4 LAST 819                    E5          EBANK=  BMEMORY
 0186                          30,2114   02574 0  PIP2CADR  2CADR   PIPACR
 0187  REF   1                 30,2116   3 2124 1 AVEGOUT   CA      AVOUTADR
 0188  REF  17 LAST 762        30,2117   55,310 0           TS      OVSELECT
 0189  REF   1                 30,2120   1 2102 1           TCF     MAKEAVRV

 01892 REF 156 LAST 807        30,2121   4 7763 0 SLIPONE   CS      ONE          RESCHEDULE DAP EVENT TO OCCUR 10 MS
 01894 REF  19 LAST 819        30,2122   26 030 0           ADS     TIME5        FARTHER INTO THE FUTURE.
 01902 REF   2 LAST 581        30,2125   02015 1  AVDOADR   GENADR  AVGTRB
 01904                         30,2127   77746 1  5.31SET   2OCT   77746 00031
C01904                         30,2130   00031 0
 01905                         30,2131   77771 0  5.6SET    2OCT   77771 00006
C01905                         30,2132   00006 1
```

L 206 SERVICE ROUTINES USER'S OWN PAGE NO. 7 S3 F5

R0193

R0194 DO SAVEM AND RESTOREM LATER IF NORMAL RESTARTS SHOULD EVER RETURN

```
0195  REF  93 LAST 819     30,2133  3 7762 0  SERVICER CAF    TWO
0196  REF   1              30,2134  55,512 1  PIPCHECK TS     PIPCTR

0197                       30,2135  6 0000 1          DOUBLE
0198  REF 305 LAST 819     30,2136  50 000 1          INDEX   A
0200  REF   1              30,2140  0 2150 1          TC      P2PTROP

0208  REF   0 LAST 821     30,2150  01,550 1  PIPLOOP TCS     RLR2BAP         O UE  T B B     M
0209  REF   1              30,2151  1 2134 1          TCF     PIPCHECK

0210  REF 110 LAST 818     30,2152  0 4161 0          TC      PHASCHNG        RESTART REREADAC + SERVICER
0211                       30,2153    16035 0         OCT     16036
0212                       30,2154    20000 0         OCT     20000
0213  REF   5 LAST 820                   F5          FBANK=  BMEMORY
0214                       30,2155    02161 0         2CADR   GOMASS
C0214 REF   1              30,2156    60065 1
0215  REF 130 LAST 805     30,2157  0 5206 0          TC      BANKCALL        PIPA COMPENSATION CALL
0216  REF   2 LAST 454     30,2160    25222 1         CADR    1/PIPA

0217  REF  78 LAST 812     30,2161  0 6112 0  GOMASS  TC      INTPRET
0218                       30,2162    51575 1         VLOAD   ABVAR
0219  REF   4 LAST 685     30,2163    00404 1                 DELV
0220  REF   7 LAST 735     30,2164    36535 1         STCALL  ABDELV
0221  REF   1              30,2165    61206 1                 MASSMON

0222                       30,2166    77624 1         CALL
0224                       30,2170    77776 1         EXIT

0225  REF 111 LAST 821     30,2171  0 4161 0          TC      PHASCHNG
0226                       30,2172    10035 0         OCT     10035

0227                       30,2173  0 0004 0  COPYCYCL INHINT
0228  REF   2 LAST 544     30,2174  3 7760 1          CAF     EIGHT
0229  REF  81 LAST 731     30,2175    54 061 1         TS      ITEMP1
```

engineer BO 480

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```
0230                          30,2176  6 0000 1          DOUBLE
0231   REF  43 LAST 708       30,2177  54 062 1          TS      ITEMP2
0232                          30,2200  0 0006 1          EXTEND
0233   REF  44 LAST 822       30,2201  5 0062 0          INDEX   ITEMP2
0234   REF   1                30,2202  3 1051 1          DCA     RN1
0235   REF  45 LAST 822       30,2203  50 062 0          INDEX   ITEMP2
0236   REF   8 LAST 774       30,2204  53,011 1          DXCH    RN
0237   REF  82 LAST 821       30,2205  10 061 1          CCS     ITEMP1
0238   REF   1                30,2206  1 2175 1          TCF     COPYCYCL +2
0239                          30,2207  0 0006 1          EXTEND
0240   REF   1                30,2210  3 1560 0          DCA     DAREATMP
0241   REF   2 LAST 335       30,2211  53,552 0          DXCH    DELAREA
0242                          30,2212  0 0006 1          EXTEND
0243   REF   1                30,2213  3 1562 1          DCA     MASSTEMP
0244   REF   7 LAST 748       30,2214  53,321 1          DXCH    MASS
0245                          30,2215  0 0006 1          EXTEND
0246   REF   6 LAST 772       30,2216  3 1307 1          DCA     PIPTIME
0247   REF   3 LAST 774       30,2217  53,327 1          DXCH    STATTME         STATE VECTOR TIME FOR DOWNLINK.

0248   REF  42 LAST 716       30,2220  3 7760 1          CAF     BIT4            SIVBGONE BIT
0249   REF  27 LAST 819       30,2221  7 0075 1          MASK    FLAGWRD1
0250                          30,2222  0 0006 1          EXTEND
0251   REF   1                30,2223  1 2230 0          BZF     CHGPHASF

0252   REF   4 LAST 670       30,2224  3 5655 1          CAF     PRIO34
0253   REF  29 LAST 817       30,2225  0 5505 1          TC      NOVAC
0254   REF  34 LAST 634                     F6           FBANK=  DT
0255                          30,2226  02713 0           2BCADR  1/ACCS
C0255  REF   2 LAST 490       30,2227  54066 0
0256   REF 112 LAST 821       30,2230  0 4161 0  CHGPHASF TC      PHASCHNG
0257                          30,2231  10035 0           DCT     10035

0258   REF  18 LAST 820       30,2232  0 1310 1          TC      DVSELECT


0259   REF   6 LAST 757                30,2251  AGSMON   EQUALS  AVERAGEG

0260                          30,2233  63401 1  -MAXDELV DEC     -6398           3200 PULSES/SEC FOR 2 SEC.  CCS TAKES 1.

R0261  ***************************************MAINTAIN THE ORDER OF THE CONSTANTS BETWEEN THE ASTERISKS.
0263                          30,2234  00620 0  PLUSXDVA DEC     400             200 CM/SEC(2)= ASCENT THRESHOLD
0264                          30,2235  00310 0  200DEC   DEC     200
0265                          30,2236  00055 1  PLUSXDVD DEC     45              22.5 CM/SEC SQ = DESCENT THRESHHOLD.
R0266  ***************************************

0267   REF  31 LAST 747       30,2237  3 7762 0  PGNCSMON CAF     BIT2            CHECK CHANNEL 30 TO SEE IF STAGING HAS
```

```
0269                                30,2241  02 030 0        RAND   30      AND DESCENT PLUSXDV IS USED -- OTHERWISE
0270   REF 306 LAST 821             30,2242  50 000 1        INDEX  A       THE ASCENT PLUSXDV IS EMPLOYED.
```

```
0278  REF   8     I 821     30,2245  0 0006 1            EXTEND  PBJEVDVA
0276  REF  21 LAST 818     30,2250  55'511 1            TS      DVCNTR          HRUS IS K  R S  H DV M I R

0277  REF 113 LAST 822     30,2251  0 4161 0  AVERAGEG   TC      PHASCHNG
0279                       30,2253  0 0006 1            EXTEND
0280  REF  20 LAST 762     30,2254  3 1073 1            DCA     AVGEXIT
0281  REF  32 LAST 773     30,2255  52 006 0            DXCH    Z               AVERAGEG EXIT



0282  REF  22 LAST 823     30,2256  11'511 1  THRUSTCO  CCS     DVCNTR
0283  REF  11 LAST 758     30,2257  1 2323 0            TCF     SERVEXIT -1     NO STEERING IF NO THRUST.
0284  REF  28 LAST 822     30,2260  3 0075 0  NODV      CA      FLAGWRD1
0285  REF  31 LAST 812     30,2261  7 7757 1            MASK    BIT5
0287  REF   1              30,2263  1 2317 1            TCF     ENGNFAIL        YES.  GIVE FAIL ALARM.
0288  REF 114 LAST 823     30,2264  0 4161 0            TC      PHASCHNG        NO.  GO OUT THRU DVMNEXIT.
0289                       30,2265  10035 0             DCT     10035

0290  REF   1              30,2266  3 2315 1            CAF     AVEGADDR        REMOVE DV MONITOR.
0291  REF  19 LAST 822     30,2267  55'310 0            TS      DVSELECT

0292                       30,2270  0 0006 1  DVEXIT    EXTEND                  BRANCH TO SELECTED LOCATION
0293  REF  10 LAST 762     30,2271  3 1075 1            DCA     DVMNEXIT
0294  REF  33 LAST 823     30,2272  52 006 0            DXCH    Z

0295  REF   9 LAST 823     30,2273  4 1534 0  BOOSTMON  CS      ABDELV          COMPARE ABDELV TO THRSHLD+ TO DETECT
0296  REF   1              30,2274  6 2316 1            AD      THRSHLD+        BOOSTER SHUTDOWN
0297                       30,2275  0 0006 1            EXTEND
0298  REF   7 LAST 822     30,2276  6 2251 0            BZMF    AVERAGEG

0299                       30,2277  0 0004 0            INHINT                  SHUTDOWN HAS OCCURRED
0300  REF   8 LAST 819     30,2300  3 7746 0            CAF     PRIO20
0301  REF  30 LAST 822     30,2301  0 5505 1            TC      NOVAC           SET UP MISSION PHASE 6 JOB
0302  REF   6 LAST 821                    E5            EBANK=  BMEMORY
0303                       30,2302  02504 1             2CADR   MP6JOB          NO VAC AREA NEEDED
C0303 REF   1              30,2303  56065 1
0304  REF 115 LAST 823     30,2304  0 4161 0            TC      PHASCHNG
0306                       30,2306  20000 0             DCT     20000
0307  REF   7 LAST 823                    F5            EBANK=  BMEMORY
0308                       30,2307  02504 1             2CADR   MP6JOB
```



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L       206 SERVICE ROUTINES                                        USER'S OWN PAGE NO.  10          S3  F5

03081 REF 116 LAST 823     30,2311  0 4161 0            TC      PHASCHNG
03082                      30,2312  10035 0             DCT     10035

0309  REF   2 LAST 823     30,2313  3 2315 1  DVMNKILL  CAF     AVEGADDR        REMOVE DV MONITOR FROM SERVICER
0310  REF  20 LAST 823     30,2314  55'310 0            TS      DVSELECT

0311  REF   8 LAST 823     30,2315  0 2251 0  AVEGADDR  TC      AVERAGEG

0312                       30,2316  01724 1   THRSHLD+  DEC     980             BOOSTER SHUTDOWN AT 1/2 G OVER 2 SECS

0313  REF  41 LAST 821     30,2317  0 4755 1  ENGNFAIL  TC      ALARM
0314                       30,2320  01405 1             OCT     1405            DVALARM.  ENGINE ON BUT NO THRUST.

0315  REF  45 LAST 805     30,2321  0 5225 1            TC      POSTJUMP
0316  REF   4 LAST 814     30,2322  16007 1             CADR    FORGETIT        SHUTDOWN.
```

```
0317   REF  23 LAST 823      30,2323  55,511 1  -1         TS     OVCNTR
0318   REF 117 LAST 824      30,2324  0 4161 0  SERVEXIT  TC     PHASCHNG
0319                         30,2325   00035 1             OCT    00036

0320   REF  90 LAST 812      30,2326  1 5567 1            TCF    ENDOFJOB
```

```
P0321   ***** GIMBL MONITOR - USED PRIOR TO PGNCSMON IN DPS BURNS **************

 0322   REF  10 LAST 823                    F5          EBANK= ABDELV
 0323   REF   2 LAST  88      30,2327  3 1336 0  GIMBLMON CA     SLOSHCTR       FIRST CONDITION FOR USE OF TRIM GIMBAL-
 0324                         30,2330  0 0006 1          EXTEND                     THAT SLOSH HAS NOT BUILT UP TO THE
 0325   REF   1               30,2331  1 2357 0          BZF    GIMBOFF             POINT THAT THE GIMBAL IS NOT USEFUL
 0326                         30,2332  0 0006 1          EXTEND
 0327   REF   3 LAST 825      30,2333  27336 1           DIM    SLOSHCTR

 0328   REF   1               30,2334  4 2365 1          CS     GTBRSHLD       SECOND CONDITION FOR USE OF TRIM GIMBAL-
 0329   REF  11 LAST 825      30,2335  6 1534 1          AD     ABDELV              THAT DPS THRUST HAS ATTAINED A FAIR
 0330                         30,2336  0 0006 1          EXTEND                     DEGREE OF STABILITY
 0332   REF  25 LAST 812      30,2340  4 0076 1          CS     FLAGWRD2       THIRD CONDITION FOR USE OF TRIM GIMBAL-
 0333   REF  43 LAST 822      30,2341  7 7760 0          MASK   BIT4                THAT THROTTLING IS NOT NOW UNDERWAY.
 0334                         30,2342  0 0006 1          EXTEND                     THIS FLAG IS SET WHEN THROTTLING IS
 0335   REF   3 LAST 215      30,2343  1 2237 1          BZF    PGNCSMON            BEGUN AND RESET WHEN IT IS OVER.

 0336   REF  43 LAST 689      30,2344  3 7752 0          CA     BIT10          FOURTH CONDITION FOR USE OF TRIM GIMBAL-
 0337                         30,2345  0 0006 1          EXTEND                     THAT GIMBAL HAS NOT FAILED
 0338                         30,2346  02 032 1          RAND   32
 0339                         30,2347  0 0006 1          EXTEND
 0346                         30,2351  0 0004 0  GIMBLON  INHINT                 IF WE GET THIS FAR IT IS OK TO TURN ON
 0347   REF   7 LAST 632      30,2352  4 7762 1          CS     USEFORJTS       THE GLORIOUS TRIM GIMBAL
 0348   REF  60 LAST 765      30,2353  7 0077 0          MASK   DAPBOOLS
 0349   REF  61 LAST 825      30,2354  54 077 0          TS     DAPBOOLS
 0350                         30,2355  0 0003 1          RELINT

 0354                         30,2357  0 0004 0  GIMBLOFF INHINT                 IT IS NECESSARY FOR SOME REASON TO
 0355   REF  62 LAST 825      30,2360  4 0077 0          CS     DAPBOOLS        TURN OFF THE TRIM GIMBAL
 0356   REF   8 LAST 825      30,2361  7 7762 1          MASK   USEFORJTS
L0360   206 SERVICE ROUTINES  30,2365   000 4 6  GTBRSHLD DEC    60              ABBREVIATED FLAGBONDOS (THRUST )     53  F5

P0362   REF   9 LAST 788  0    RMINA   R ADACES AND AV RAGE   EBANK= DVTOTAL
 0363   REF   7 LAST 822      30,2366  3 1307 1  AVGEND   CA     PIPTIME +1      FINAL AVERAGE G EXIT
 0365   REF   8 LAST 807      30,2370  0 6060 1          TC     FLAGUP          SET DRIFT FLAG
 0366                         30,2371   40000 0          OCT    40000

 0367                         30,2372  0 0006 1          EXTEND
 0368   REF   1               30,2373  3 7411 1          DCA    AVEMIDAD        TRANSFER STATE VECTOR VIA AVETOMID
 0369   REF  34 LAST 823      30,2374  52 006 0          DXCH   Z

 0370   REF 118 LAST 824      30,2375  0 4161 0          TC     PHASCHNG
 0371                         30,2376   04025 1          OCT    04025           POOH WILL TURN OFF PHASE5

 0373   REF  29 LAST 823      30,2400  7 0075 1          MASK   FLAGWRD1        FLAG IS UP BUT RATHER TO ENDOF JOB
 0374                         30,2401  0 0006 1          EXTEND
 0375   REF   2 LAST 723      30,2402  1 4272 0          BZF    POOH
03751   REF 119 LAST 826      30,2403  0 4161 0          TC     PHASCHNG        MAKE GROUP 5 INACTIVE
03752                         30,2404   00005 1          OCT    5

03754   REF  21 LAST 763      30,2405  0 6067 0          TC     FLAGDWN         NOT MORE THAN ONE USE OF THIS FLAG.
03756                         30,2406   00040 0          OCT    00040

 0376   REF  91 LAST 824      30,2407  1 5567 1          TCF    ENDOFJOB

 0377   REF   6 LAST 773                    F4          EBANK= AVMIDRTN
 0378                         30,2410   02116 0  AVEMIDAD 2CADR  AVETOMID
C0378   REF   1               30,2411   16064 1
```

P0379 NORMLIZE PERFORMS THE INITIALIZATION REQUIRED PRIOR TO THE FIRST ENTRY TO AVERAGEG. AND SCALES RN SO THAT IT
R0381 HAS 1 LEADING BINARY ZERO. IN MOST MISSIONS, RN WILL BE SCALED AT 2(+29), BUT IN THE 206 MISSION, RN WILL BE
R0383 SCALED AT 2(+24)M. TIME OF RN,VN IS IN STATIME FOR DWNLINK

```
0384  REF   5 LAST 817          E4          EBANK= RAVEGON
0385                    30,2412   0 0004 0  NORMLIZF INHINT
0386  REF   5 LAST 774 30,2413   3 7764 0          CAF     FLFVFN          INITIALIZF INDEX=DEC 11
0387  REF  59 LAST 812 30,2414   54 070 1          TS      RUPTREG1
0390  REF  61 LAST 827 30,2417   301070 0          INDEX   RUPTREG1
0392  REF  62 LAST 827 30,2422   107070 0          TCF     NORMLIZF +2             V
0394                    30,2423   0 0006 1          EXTEND
0399  R F      LAS    30,2430   45175 0           DCOM    GAMTRM          S A     IM  F R DWNLINK
0400  REF  10 LAST 827 30,2431   01011 0                   RN              LOAD RN VFC FOR CALCGRAV
0401  REF   1          30,2432   61103 1                   CALCGRAV        INITIALIZF UNITR RMAG GDT1
0402  REF   2 LAST 685 30,2433   01025 1          STORF   GDT/2
```


P0405 VPATCHER IS AN ADAPTATION OF NORMLIZE WHICH IS CALLED AFTER MIDTOAVE HAS BEEN PERFORMED AND PRIOR TO
R0407 PREBURN PROGRAMS THAT REQUIRE IGNITION STATE POSITION, VELOCITY, AND GRAVITY VECTORS IN REGISTERS RN,VN, AND
R0409 GDT/2. THE REGISTERS ARE RE-INITIALIZED BY NORMLIZE WHEN PREREAD CALLEDRED BY NORMLIZE WHEN PREREAD IS CALLED

R0411 NAME= DATE=
R0412 VPATCHER 20 OCTOBER 1966
R0413 PROGRAMMER SUBROUTINES CALLED
R0414 SCHULENBERG CALCGRAV

R0415 CALLING SEQUENCE
R0416 IF IN BASIC L-1 TC INTPRET
R0417 L CALL VPATCHER
R0418 L+1 EXIT
R0419 NORMAL EXIT
R0420 AT L+1 OF CALLING SEQUENCE
R0421 DEBRIS
R0422 RN, VN, GDT/2, UNITR, RMAG

R0423 OUTPUT
R0425 IGNITION IN VN*2(+7)M/CS
R0426 GDT/2 AT IGNITION IN GDT/2*2(+7)M/CS
R0427 UNIT RIGNITION IN UNITR *2(+1)M
R0428 RMAG AT 2(+24)M

```
0429                    30,2436   77420 1  VPATCHER STQ     EXIT
0430  REF   1          30,2437   01155 1           TPMX
0431                    30,2440   0 0004 0          INHINT
0433  REF   5 LAST 817 30,2441   3 7751 0          CAF     EBANK4
0434  REF  52 LAST 817 30,2442   56 003 1          XCH     EBANK
0435  REF  36 LAST 803 30,2443   54 071 0          TS      RUPTREG2
0436  REF   6 LAST 827 30,2444   3 7764 0          CAF     FLFVFN          INITIALIZF INDEX TO DEC 11
0437  REF  63 LAST 827 30,2445   54 070 1  VPATLOOP TS     RUPTREG1
0438  REF  64 LAST 828 30,2446   50 070 0          INDEX   RUPTREG1
0439  REF   2 LAST 773 30,2447   3 1400 1          CA      RIGNTION
```

```
0439  REF   2 LAST 773   30,2447   3 1400 1    CA      RIGNTION
0440  REF  55 LAST 828   30,2450   50 070 0    INDEX   RJPTRFG1
0441  REF  11 LAST 827   30,2451   55'010 0    TS      RN              STORE RN,VN
0442  REF  56 LAST 828   30,2452   10 070 1    CCS     RJPTRFG1
0444  REF                30,2454   0 0006 1    TCF     VPATLOOP
0445  REF   2 LAST 773   30,2455   3 1777 1    DCA     TIGNTION
0446  REF   5 LAST 827   30,2456   53'327 1    DXCH    STATIME         STATE TIME FOR DWNLINK
0447  REF  37 LAST 828   30,2457   3 0071 1    CA      RJPTRFG2
0448  REF  53 LAST 828   30,2460   54 003 0    TS      EBANK
0449                     30,2461   0 0003 1    RELINT
0450  REF  30 LAST 827   30,2462   0 6112 0    TC      INTPRFT
0451                     30,2463   45175 0     VLOAD   CALTI
```

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```
0452  REF  12 LAST 828    30,2464   01011 0          RN          LOAD RN VEC FOR CALCGRAV
0453  REF   2 LAST 827    30,2465   61103 1          CALCGRAV

0454  REF   3 LAST 827    30,2466   35025 0    SICALL GDT/2
0455  REF   2 LAST 828    30,2467   01155 1          TEMX
```

```
P0457

R0458   ********************************   FLAG SUBROUTINES   ************************************************************
R0460

 0461                                  6051          BLOCK  03
R0462      THE FLAG SUBROUTINES ARE USED TO SET OR RESET FLAGS (BITS) IN FLAGWRD1 AND FLAGWRD2. THE BIT(S) TO BE SET OR
R0464   RESET IS(ARE) INDICATED BY THE OCTAL NUMBER FOLLOWING THE TC CALL. THE CALLING SEQUENCES ARE -
R0466
A0467                                                 TC     FLAG1UP         SET BIT(S) IN FLAGWRD1 CORRESPONDING TO
A0468                                                 OCT    XXXXX           THE 1 BITS IN NUMBER XXXXX.

A0469                                                 TC     FLAG1DWN        RESET BIT(S) IN FLAGWRD1 CORRESPONDING
A0470                                                 OCT    XXXXX           TO THE 1 BITS IN NUMBER XXXXX.

R0471   THE CALLING SEQUENCES FOR FLAGWRD2 ARE SIMILAR.

R0472      NOTE THAT FLAGWRD1 AND FLAGWRD2 CORRESPOND TO INTERPRETIVE SWITCHES 15D THROUGH 44D.
R0474
R0475           FLAGWORD BITS ARE DEFINED IN LOG SECTION "ERASABLE ASSIGNMENTS"

 0476                                  6051  0 0004 0  FLAG1UP  INHINT                  SET FLAG 1 SUBROUTINE
 0477   REF  30 LAST 826               6052  4 0075 1          CS     FLAGWRD1
 0478   REF 231 LAST 811               6053  50 002 0          INDEX  Q
 0479                                  6054  7 0000 0          MASK   0
 0480   REF  31 LAST 830               6055  26 075 1          ADS    FLAGWRD1

 0481                                  6056  0 0003 1          RELINT
 0482   REF   6 LAST 308               6057  1 7015 0          TCF    Q+1

 0483                                  6060  0 0004 0  FLAG2UP  INHINT                  SET FLAG 2 SUBROUTINE
 0484   REF  26 LAST 825               6061  4 0076 1          CS     FLAGWRD2
 0485   REF 232 LAST 830               6062  50 002 0          INDEX  Q
 0486                                  6063  7 0000 0          MASK   0
 0487   REF  27 LAST 830               6064  26 076 1          ADS    FLAGWRD2

 0488                                  6065  0 0003 1          RELINT
 0489   REF   7 LAST 830               6066  1 7015 0          TCF    Q+1

 0490   REF 233 LAST 830               6067  50 002 0  FLAG1DWN INDEX  Q                RESET FLAG 1 SUBROUTINE
 0491                                  6070  4 0000 0          CS     0
 0492                                  6071  0 0004 0          INHINT
 0493   REF  32 LAST 830               6072  7 0075 1          MASK   FLAGWRD1
 0494   REF  33 LAST 830               6073  54 075 1          TS     FLAGWRD1
 0495                                  6074  0 0003 1          RELINT
 0496   REF   8 LAST 830               6075  1 7015 0          TCF    Q+1

 0497   REF 234 LAST 830               6076  50 002 0  FLAG2DWN INDEX  Q                RESET FLAG 2 SUBROUTINE
 0498                                  6077  4 0000 0          CS     0
 0499                                  6100  0 0004 0          INHINT
```

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```
0500  REF  28 LAST 830      6101  7 0076 1          MASK    FLAGWRD2
0501  REF  29 LAST 831      6102  54 076 1          TS      FLAGWRD2
0502                        6103  0 0003 1          RELINT
0503  REF   9 LAST 830      6104  1 7015 0          ICF     Q+1

0504  REF   1               6105   02327 0  GMBLMNAD GENADR  GIMBLMON

0505  REF   6 LAST 825      6106   02237 0  PGNSCADR GENADR  PGNCSMON

0506                        6107   00133 0  BURNDB   DEC     0.00556      1 DEGREE DEADBAND SCALED AT PI RADIANS
0507                        6110   00033 1  NARROWDB DEC     0.00167      .3 DEGREE DEADBAND SCALED AT PI RADIANS
0508                        6111   00707 1  WIDEDB   DEC     0.02778      5 DEGREE DEADBAND SCALED AT PI RADIANS
```

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L       TUMBLE MONITOR                                          USER'S OWN PAGE NO.  1          53

R0010   PROGRAM DETECTS SPIN ABOUT NAV.AXES AND SETS BIT 13 OF FLAGWORD1 ON IF SPIN IS IN EXCESS OF 2.99 DEGREES/SEC .
R0020   NO CONTROL ACTION IS EXERTED . TO DISCONTINUE MONITORING , TURN BIT 14  OF FLAGWORD1 OFF . TO INITIATE MONITOR ,
R0030   SET UP WAITLIST CALL FOR TUMTASK. IT IS ASSUMED THAT THE IMU,S ARE IN   FINE ALIGN .
R0032

R0045   NAME=                              DATE=
R0050     TUMBLE MONITOR                    29 AUGUST 1966
R0052   PROGRAMMER=                        REVISIONS=
R0053     G.MANSBACH EXT-182                NANSTONE/2
R0054                                       NANSTONE/7
R00541                                      NANSTONE/15   10/27/66
R00542                                      NANSTONE/3    11/12/66
R0055   CALLING SEQUENCE=                  SUBROUTINES CALLED=
R0060           CAF     (DT)                FLAG1UP
R0065           TC      WAITLIST            FLAG1DOWN
R0066           EBANK= OMEGA
R0070           2CADR   TUMTASK
R0075   NORMAL EXIT MODES=                 ABORT MODE=
R0080           TC      TASKOVER            TURN BIT 14 OF FLAGWORD1 OFF
R0085   OUTPUT=
R0090     SET BIT 13 OF FLAGWORD1 ON/OFF
R0095   DEBRIS=
R0100     PCDUY,PCDUZ,PCDUX,DCDUY,DCDUZ,OMEGA
 0105                                  30,2470          BANK   30
 0107   REF   3 LAST 683                 E6           EBANK= OMEGA
A0175                                                              INITIALIZATION ROUTINE FOR TUMBLE
A0180                                                              MONITOR

 0185   REF 120 LAST 826      30,2470  0 4161 0  TUMTASK  IC      PHASCHNG     IMMEDIATE RECALL
 0186                         30,2471   05013 0            DCI     05013       *TUMTASK*
 0187                         30,2472   77777 0            DCI     77777
 0190   REF   7 LAST 817      30,2473  0 6051 0            IC      FLAG1UP      TURN TUMBLE MONITOR ON
 0195                         30,2474   20000 0            DCI     20000
 0220   REF   1               30,2475  0 2547 0            IC      RESET
 0225   REF 109 LAST 819      30,2476  0 5727 0            IC      TASKOVER

 0340   REF  45 LAST 817      30,2477  3 7746 0  TMTSK     CA      BIT14
 0345   REF  34 LAST 830      30,2500  7 0075 1            MASK    FLAGWRD1     IS TUMBLE MONITOR STILL NEEDED
 0350                         30,2501  0 0008 1            EXTEND
 0355   REF   1               30,2502  1 2542 1            BZF     EOTUM        IF IS NOT.  DISCONTINUE MONITORING

 0365   REF   2 LAST 832      30,2503  0 2547 0            IC      RESET        IF IS.
A0370                                                              COMPUTE ROTATION RATE ABOUT PILOT AXES
A0375                                                              USING OUTPUT OF *TRANSFORMATION MATRIX
A0380                                                              CALCULATION* OF *TKUPT PROGRAM*

A0384                                                              COMPUTE
A0385                                                                    * OMEGAX *   *     *   * DCDUY *
```

```
L       TUMBLE MONITOR                                                  USER'S OWN PAGE NO.  2          S3  E6

A0390                                                                                * OMEGAY * = * M   * X * DCDUZ *
A0395                                                                                * OMEGAZ *   *  GP *   **DCDUX *

 0415   REF   4 LAST 832     30,2504  55'422 0          IS      OMEGA       COMPUTE OMEGAX
 0420   REF  15 LAST 503     30,2505  3 1404 0          CA      M11
 0425   REF   1              30,2506  0 2526 1          TC      EVAL
 0430   REF   7 LAST 600     30,2507  3 1401 0          CA      M22         COMPUTE OMEGAY
 0435                        30,2510  0 0006 1          EXTEND
 0440   REF   1              30,2511  7 1420 1          MP      DCDUZ
 0445   REF   5 LAST 833     30,2512  55'422 0          IS      OMEGA
 0450   REF   5 LAST 600     30,2513  3 1405 1          CA      M21
 0455   REF   2 LAST 833     30,2514  0 2526 1          TC      EVAL
 0460   REF   6 LAST 600     30,2515  3 1403 1          CA      M32         COMPUTE OMEGAZ
 0465                        30,2516  0 0006 1          EXTEND
 0470   REF   2 LAST 833     30,2517  7 1420 1          MP      DCDUZ
 0475   REF   6 LAST 833     30,2520  55'422 0          IS      OMEGA
 0480   REF   5 LAST 600     30,2521  3 1406 1          CA      M31
 0485   REF   3 LAST 833     30,2522  0 2526 1          TC      EVAL
A0490                                                                NO TUMBLE NOTED
 0495   REF  22 LAST 826     30,2523  0 6067 0          TC      FLAGIDWN    REMOVE TUMBLE FLAG
 0500                        30,2524   10000 0          DCI     10000
 0505   REF 110 LAST 832     30,2525  0 5727 0          TC      TASKOVER
 0510                        30,2526  0 0006 1  EVAL    EXTEND              COMPLETE OMEGA CALCULATION
 0515   REF   1              30,2527  7 1416 1          MP      DCDUY
 0520   REF   7 LAST 833     30,2530  6 1422 1          AD      OMEGA       SCALE FACTOR OF PI
A0540                                                                EVALUATE TUMBLE RATE
 0545                        30,2531  0 0006 1          EXTEND              SET ALL VALUES NEG.
 0550                        30,2532  6 2534 1          BZMF    +2
 0555   REF 308 LAST 823     30,2533  4 0000 0          DS      A
 0560   REF   1              30,2534  6 2546 1          AD      CRIT        CAUSE UNDERFLOW IF OMEGA IS GREATER THAN
 0565                        30,2535  54 000 0          OVSK                OR = TO 2.99 DEGREES/SEC
 0570                        30,2536  0 0002 0          RETURN              NO TUMBLE . EVALUATE NEXT AXIS

A0575                                                                EXCESSIVE TUMBLE NOTED ABOUT AN AXIS
 0580   REF   8 LAST 832     30,2537  0 6051 0          TC      FLAGIUP     SET TUMBLE FLAG AND DISCONTINUE CALCS.
 0585                        30,2540   10000 0          DCI     10000
 0605   REF 111 LAST 833     30,2541  0 5727 0          TC      TASKOVER
 0610   REF 121 LAST 832     30,2542  0 4161 0  EOTUM   TC      PHASCHNG
 0612                        30,2543   00003 1          DCI     3
 0615   REF 112 LAST 833     30,2544  0 5727 0          TC      TASKOVER
 0620                        30,2545   00144 0  1SECIM   DEC     100         1 SECOND
 0625                        30,2546   40417 1  CRIT     DCI     40417       NEGMAX + 00417   421 = 2.99 DEGREES

A0698                                                                RECALL MONITOR IN
A0699                                                                   1 SECOND
 0700                        30,2547  0 0006 1  RESET    EXTEND
 0701   REF   8 LAST 833     30,2550  23'422 1          GXCH    OMEGA
 0704   REF   1              30,2551  3 2545 1          CA      1SECIM
 0705   REF 120 LAST 819     30,2552  0 5663 1          TC      WAITLIST
```

L TUMBLE MONITOR USER'S OWN PAGE NO. 3 S3 E6

```
 0709   REF   9 LAST 833              E6          EBANK= OMEGA
 0710                          30,2553   02477 1   2CADR  TMTSK
A0745   REF   1                30,2554   60066 1
A0746                                                        STORE PRESENT CDU(X,Y,Z) AND
A0747                                                        COMPUTE DELTA(CDU(X,Y,Z)/SEC =
 0750   REF  23 LAST 669       30,2555   3 0033 1   CA     CDUY      DCDU(X,Y,Z)
 0755   REF   1                30,2556   57'412 1   XCH    PCDUY     FOR Y-AXIS
 0760                          30,2557   0 0006 1   EXTEND           STORE PRESENT VALUE AND RECOVER PREVIOUS
 0765   REF  24 LAST 834       30,2560   20 033 0   MSU    CDUY
 0770   REF   2 LAST 833       30,2561   55'416 1   TS     DCDUY     = CDUX(T-1)-CDUX(T)
 0775   REF  15 LAST 654       30,2562   3 0034 0   CA     CDUZ      FOR Z-AXIS
 0780   REF   1                30,2563   57'413 0   XCH    PCDUZ
 0785                          30,2564   0 0006 1   EXTEND
 0790   REF  16 LAST 834       30,2565   20 034 1   MSU    CDUZ
 0795   REF   3 LAST 833       30,2566   55'420 1   TS     DCDUZ
 0800   REF  33 LAST 671       30,2567   3 0032 0   CA     CDUX      FOR X-AXIS
 0805   REF   1                30,2570   57'411 1   XCH    PCDUX
 0810                          30,2571   0 0006 1   EXTEND
 0815   REF  34 LAST 834       30,2572   20 032 1   MSU    CDUX
 0820   REF  10 LAST 834       30,2573   0 1422 1   TC     OMEGA
```

L PIPA READER USER'S OWN PAGE NO. 1 S3

```
R00001  *****  PIPA READER *****

R00002                  MOD NO. 00  BY D. LICKLY  DEC.9 1966

R00003  FUNCTIONAL DESCRIPTION

R0001       SUBROUTINE TO READ PIPA COUNTERS, TRYING TO BE VERY CAREFUL SO THAT IT WILL BE RESTARTABLE.
R0003       PIPA READINGS ARE STORED IN THE VECTOR DELV. THE HIGH ORDER PART OF EACH COMPONENT CONTAINS THE PIPA READING.
R0005       RESTARTS BEGIN AT REREADAC.


R00071      AT THE END OF THE PIPA READER THE CDUS ARE READ AND STORED AS A
R00072  VECTOR IN CDUTEMP.  THE HIGH ORDER PART OF EACH COMPONENT CONTAINS
R00073  THE CDU READING IN 2S COMP IN THE ORDER CDUX,Y,Z.  THE THRUST
R00074  VECTOR ESTIMATOR IN FINDCDUD REQUIRES THE CDUS BE READ AT PIPTIME.

R0008   CALLING SEQUENCE AND EXIT

R0009       CALL VIA TC, ISWCALL, ETC.

R0010       EXIT IS VIA Q.


R0022   INPUT

R0023       INPUT IS THROUGH THE COUNTERS PIPAX, PIPAY, PIPAZ, AND TIME2.


R0024   OUTPUT

R0025       HIGH ORDER COMPONENTS OF THE VECTOR DELV CONTAIN THE PIPA READINGS.
R0027       PIPTIME CONTAINS TIME OF PIPA READING.


R0028   DEBRIS (ERASABLE LOCATIONS DESTROYED BY PROGRAM)

R0029               TEMX    TEMY    TEMZ    PIPAGE


 00311                                      30,2574             BANK    30
 1032                                 30,2574  0 0006 1  PIPASR  EXTEND
 1033   REF   35 LAST  769            30,2575  3 0025 0          DCA     TIME2
 1034   REF    8 LAST  826            30,2576  53'307 0          DXCH    PIPTIME         CURRENT TIME  POSITIVE VALUE.

 1035   REF  238 LAST  817            30,2577  4 7767 1          CS      ZERO            INITIALIZE THESE AT NEG ZERO.
 1036   REF    3 LAST  829            30,2600  55'155 0          TS      TEMX
 1037   REF    1                      30,2601  55'156 0          TS      TEMY
 1038   REF    1                      30,2602  55'157 1          TS      TEMZ
```

L PIPA READER USER'S OWN PAGE NO. 2 53

```
1039    REF 239 LAST 835    30,2603  3 7767 0            CA    ZERO
1040    REF   4 LAST 453    30,2604  54 407 0            TS    DELVZ       OTHER DELVS OR INCLUDING LOW ORDER
1041    REF   4 LAST 453    30,2605  54 405 1            TS    DELVY

1042    REF   1             30,2606  55'331 0           TS    CDUTEMP +1  INITIALIZE THESE FOR FINDCDUD
1043    REF   2 LAST 836    30,2607  55'333 1           TS    CDUTEMP +3
1044    REF   3 LAST 836    30,2610  55'335 1           TS    CDUTEMP +5

1045    REF   3 LAST 819    30,2611  55'161 1           TS    PIPAGE      SHOW PIPA READING IN PROGRESS

1046                        30,2612  0 0006 1  REPIPI   EXTEND
1047    REF  18 LAST 453    30,2613  4 0040 1           DCS   PIPAX       X AND Y PIPS READ
1048    REF   4 LAST 835    30,2614  53'156 0           DXCH  TEMX
1049    REF  19 LAST 836    30,2615  52 040 1           DXCH  PIPAX       PIPAS SET TO NEG ZERO AS READ.
1050    REF  13 LAST 821    30,2616  54 403 1           TS    DELVX
1051    REF   5 LAST 836    30,2617  22 405 0           LXCH  DELVY

1052    REF   9 LAST 453    30,2620  4 0041 0  REPIP3   CS    PIPAZ       REPEAT PROCESS FOR Z PIP
1053    REF   2 LAST 835    30,2621  57'157 0           XCH   TEMZ
1054    REF  10 LAST 836    30,2622  56 041 1           XCH   PIPAZ
1055    REF   5 LAST 836    30,2623  54 407 0  DODELVZ  TS    DELVZ

1056    REF  35 LAST 834    30,2624  3 0032 0  REPIP4   CA    CDUX        READ CDUS INTO HIGH ORDER CDUTEMPS
1057    REF   4 LAST 836    30,2625  55'330 1           TS    CDUTEMP
1058    REF  25 LAST 834    30,2626  3 0033 1           CA    CDUY
1059    REF   5 LAST 836    30,2627  55'332 0           TS    CDUTEMP +2
1060    REF  17 LAST 834    30,2630  3 0034 0           CA    CDUZ
1061    REF   6 LAST 836    30,2631  55'334 0           TS    CDUTEMP +4

1062    REF 235 LAST 830    30,2632  0 0002 0           TC    Q


1063    REF   1             30,2633  11'110 1  REREADAC CCS   PHASE5      COMES HERE ON RESARTS.  IS PHASE 5 ON?
10631                       30,2634  1 2636 1           TCF   +2          YES..  GO ON.
10632   REF 113 LAST 833    30,2635  1 5727 1           TCF   TASKOVER    NO.. HAVE BEEN TO AVGEND SINCE GOJAM.

10635   REF   4 LAST 836    30,2636  11'161 1           CCS   PIPAGE      WAS I READING THE PIPS WHEN GOJAM OCCURD
1064    REF   3 LAST 820    30,2637  1 2064 0           TCF   PIPREAD     PIP READING NOT STARTED.  GO TO BEGINNING
1065    REF   1             30,2640  3 2676 1           CAF   DONEADR     SET UP RETURN FROM PIPASR
1066    REF 236 LAST 836    30,2641  54 002 1           TS    Q

1067    REF   6 LAST 836    30,2642  10 407 0           CCS   DELVZ
1068    REF   1             30,2643  1 2624 1           TCF   REPIP4      Z DONE, GO DO CDUS
1069                        30,2644  1 2647 1           TCF   +3          Z NOT DONE, CHECK Y.
1070    REF   2 LAST 836    30,2645  1 2624 1           TCF   REPIP4
1071    REF   3 LAST 836    30,2646  1 2624 1           TCF   REPIP4

1072                        30,2647  22 007 0           GL
1073    REF   6 LAST 836    30,2650  10 405 1           CCS   DELVY
```

L PIPA READER USER'S OWN PAGE NO. 3 S3

```
1074                          30,2651  1 2654 0                TCF     +3
1075  REF   1                 30,2652  1 2663 1                TCF     CHKTEMX         Y NOT DONE, CHECK X.
1076                          30,2653  1 2654 0                TCF     +1
1077  REF  11 LAST 836        30,2654  22 041 1                LXCH    PIPAZ           Y DONE, ZERO Z PIP.

1078  REF   3 LAST 836        30,2655  11'157 1                CCS     TEMZ
1079  REF   4 LAST 837        30,2656  4 1157 1                CS      TEMZ            TEMZ NOT = -0, CONTAINS -PIPAZ VALUE.
1080  REF   1                 30,2657  1 2623 0                TCF     DODELVZ
1081                          30,2660  1 2656 1                TCF     -2
1082  REF   7 LAST 836        30,2661  22 407 1                LXCH    DELVZ           TEMZ = -0, L HAS ZPIP VALUE.
1083  REF   4 LAST 836        30,2662  1 2624 1                TCF     REPIP4

1084  REF   5 LAST 836        30,2663  11'155 0  CHKTEMX       CCS     TEMX            HAS THIS CHANGED
1085  REF   6 LAST 837        30,2664  4 1155 0                CS      TEMX            YES
1086                          30,2665  1 2670 0                TCF     +3              YES
1087                          30,2666  1 2664 0                TCF     -2              YES
1088  REF   1                 30,2667  1 2612 1                TCF     REPIP1          NO
1089  REF  14 LAST 836        30,2670  54 403 1                TS      DELVX

1090  REF   2 LAST 835        30,2671  4 1156 0                CS      TEMY
1091  REF   7 LAST 836        30,2672  54 405 1                TS      DELVY

1092  REF 240 LAST 836        30,2673  4 7767 1                CS      ZERO            ZERO X AND Y PIPS
1093  REF  20 LAST 836        30,2674  52 040 1                DXCH    PIPAX           L STILL ZERO FROM ABOVE

1094  REF   1                 30,2675  1 2620 0                TCF     REPIP3

1095  REF   1                 30,2676   02065 0  DONEADR      GENADR  PIPSDONE
```

L FIND CDU DESIRED USER'S OWN PAGE NO. 1 53

```
R0001   THIS ROUTINE FINDCDUD COMPUTES DESIRED CDU,S WHICH CAN BE FED TO
R0002   DAP LATER ON.
R0003   DESIRED CDU,S WILL BE IN 2,S COMP
R0004
R0005   INPUT
R0006
R0007   DESIRED THRUST VECTOR AXISD COMING FROM GUIDANCE EQUATIONS
R0008   CDUX,CDUY,CDUZ INFORM OF A SP VECTOR CDUTEMP,+2,+4.
R0009   DELV HALF UNIT VECTOR, PIPAS READING
R0010   AXISD IS A HALF UNIT VECTOR
R0011   CDUX,Y,Z  ARE IN 2,S COMP
R0012
R0013   THIS ROUTINE CAN BE ENTERED FROM INTERPRETIVE . CALL FINDCDUD
R0014
R0015   CALLING SEQUENCE
R0016   L-1  CALL
R0017   L         FINDCDUD
R0018   L+1               INTERPRETIVE RETURN


R0018I  USER TO HAVE A UNIT VECTOR  AXIS   (1,0,0)


 0019                          30,2677            BANK   30
 0020   REF   4 LAST 300                E4         EBANK= DELK
 0021                  30,2677  24276 1  2/PI      2DEC   .6366198
C0021                  30,2700  14076 0
 0022                  30,2701  00002 0  LIMOMG    2DEC   .0001234
C0022                  30,2702  00545 0


 0023                  30,2703  77401 1  FINDCDUD  SETPD  EXIT
 0024                  30,2704  00001 0            0
 0025   REF   7 LAST 836       30,2705  3 1332 1          CA     CDUTEMP +2
00251   REF   1               30,2706  55,654 0          TS     SINCDU          TEMPORARY LOCATION FOR CDUY
00252   REF   8 LAST 838       30,2707  3 1334 1          CA     CDUTEMP +4
00253   REF   2 LAST 838       30,2710  55,656 1          TS     SINCDU +2       TEMPORARY LOCATION FOR CDUZ
00254   REF   9 LAST 838       30,2711  3 1330 0          CA     CDUTEMP
00255   REF   3 LAST 838       30,2712  55,660 1          TS     SINCDU +4       TEMPORARY LOCATION FOR CDUX


R0026   AXISFIL1  COMPUTES AXIS AND CORRECTS IT FOR QUANTIZATION ERROR AND OTH
R0027   ER ERRORS
R0028
R0029
 0048   REF  11 LAST 834                E6         EBANK= OMEGA
 0049   REF   3 LAST 167       30,2713  3 5632 0          CAF    PRIO3           OCT  03000     SWITCH EBANK
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L FIND CDU DESIRED USER'S OWN PAGE NO. 2 S3 E6

```
0050   REF  54 LAST 828     30,2714   56 003 1            XCH    EBANK
0051   REF 295 LAST 812     30,2715   54 144 1            TS     MPAC
0052   REF 241 LAST 837     30,2716    3 7767 0           CAF    ZERO
0053   REF   7 LAST 837     30,2717   55'155 0            TS     TEMX          SQOMEGA
0054   REF   8 LAST 839     30,2720   55'156 0            TS     TEMX +1       SQOMEGA +1
0055                        30,2721    0 0004 0           INHINT
0056   REF  14 LAST 509     30,2722   31'415 0            CAE    OMEGAP
0057                        30,2723    0 0006 1           EXTEND
0058                        30,2724    7 0000 0           SQUARE
0059   REF   9 LAST 839     30,2725   21'156 0            DAS    TEMX          SQOMEGA
0060   REF  18 LAST 631     30,2726   31'416 0            CAE    OMEGAQ
0061                        30,2727    0 0006 1           EXTEND
0062                        30,2730    7 0000 0           SQUARE
0063   REF  10 LAST 839     30,2731   21'156 0            DAS    TEMX          SQOMEGA
0064   REF  17 LAST 630     30,2732   31'420 0            CAE    OMEGAR
0065                        30,2733    0 0006 1           EXTEND
0066                        30,2734    7 0000 0           SQUARE
0067   REF  11 LAST 839     30,2735   21'156 0            DAS    TEMX          SQOMEGA
0068                        30,2736    0 0003 1           RELINT
0069   REF 296 LAST 839     30,2737   56 144 0            XCH    MPAC
0070   REF  55 LAST 839     30,2740   54 003 0            TS     EBANK
0071   REF  81 LAST 828     30,2741    0 6112 0           TC     INTPRET
0072   REF   5 LAST 838                     E4            EBANK= DELR
00721                       30,2742   77620 0             STQ
00722  REF   1              30,2743   01304 1                    RETSAVE
0073                        30,2744   45345 1 AXISFILT    VLOAD  DSU

0074   REF  12 LAST 839     30,2745   01156 1                    TEMX          SQOMEGA
0075   REF   1              30,2746   20702 0                    LIMOMG
0076                        30,2747   72044 1             BPL    LXA,1
0077   REF   1              30,2750   60774 0                    ROTANGLE
0078   REF  29 LAST 726     30,2751   00110 1                    FIXLOC
00781                       30,2752   64110 0             INCR,1 XCHX,1
00782                       30,2753   00024 1                    20D
00783  REF  30 LAST 792     30,2754   00050 1                    S1
00784                       30,2755   77775 1             VLOAD
00785  REF   4 LAST 838     30,2756   02255 1                    SINCDU        TEMPORARY LOCATION FOR CDUY,Z,X IN
00786                       30,2757   00025 0             STORE  20D           SP  2,S COMP
00787                       30,2760   53575 0             VLOAD  UNIT
00788  REF   5 LAST 821     30,2761   00404 1                    DELV
0079                        30,2762   00041 1             STORE  32D
0080                        30,2763   77624 1             CALL
00801  REF   6 LAST 351     30,2764   32531 1                    SMNB          TRANSFORM DELV FROM SM TO NB
00802                       30,2765   52201 0             SETPD  VSU
00803                       30,2766   00001 0                    0
00804  REF   8 LAST 817     30,2767   02241 1                    AXIS
0081                        30,2770   53322 1             VSR3   VAD
0082   REF   9 LAST 839     30,2771   02241 1                    AXIS
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L FIND CDU DESIRED USER'S OWN PAGE NO. 3 S3 E4

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 00821                          30,2772   77656 1          UNIT
 0083   REF  10 LAST 839        30,2773   02241 1          STORE  AXIS
 0084                           30,2774   62150 1  ROTANGLE LXA,1  INCR,1
 00841  REF  30 LAST 839        30,2775   00110 1                  FIXLOC
 00842                          30,2776   00024 1                  20D
 00843                          30,2777   77320 0          XCHX,1 VLOAD
 00844  REF  31 LAST 839        30,3000   00050 1                  S1
 00845  REF   5 LAST 839        30,3001   02255 1                  SINCDU          TEMPORARY LOCATION FOR CDUY,Z,X IN
 00846                          30,3002   00025 0          STORE  20D             SP  2,S COMP
 00847                          30,3003   77775 1          VLOAD
 00848  REF  11 LAST 840        30,3004   02241 1                  AXIS
 00849                          30,3005   00041 1          STORE  32D
 008491                         30,3006   77624 1          CALL                   TRANSFORM  AXIS FROM NB TO SM
 0085   REF   9 LAST 426        30,3007   32555 0                  NBSM
 00851                          30,3010   47201 1          SETPD  VXV
 00852                          30,3011   00001 0                  0
 0086   REF   3 LAST 734        30,3012   02233 1                  AXISD
 0087                           30,3013   77761 1          VXSC
 0088   REF   1                30,3014   20700 1                  2/PI
 0089                           30,3015   00013 0          STORE  10D             DTHETASM  SCALETO ONE REVOLUTION
 00891                          30,3016   77624 1          CALL                   COMPUTE SIN AND COS OF CDUS FOR
 00892  REF   1                30,3017   61064 1                  SINCOSCD        LATER USE
R0090
R0091
R0092  SMCDURES     COMPUTES CDU(GIMBAL) ANGLES FROM INCREMENTAL
R0093  CHANGES ABOUT SM AXES.    IT REQUIRES  SM  INCREMENTAL CHANGES
R0094  AS DP  VECTOR SCALED AT  ONE REVOLUTION(DTHETASM,+2,+4).  SIN,COS(CDUX,Y
R0095  ,Z)   ARE IN SINCDU,+2,+4 AND COSCDU,+2,+4  RESPECTIVELY,SCALED TO 2.
R0096  CDU INCREMENTS  ARE PLACED IN DCDU,+2,+4   SCALED TO ONE REVOLUTION
R0097
R0098
R0099
 0100                           30,3020   41345 0  SMCDUREF VLOAD  DMP
 0101                           30,3021   00013 0                  10D             DTHETASM
 0102   REF   1                30,3022   02251 0                  COSCDU +2
 0103                           30,3023   41325 0          PDDL   DMP
 0104                           30,3024   00017 1                  14D             DTHETASM +4
 0105   REF   6 LAST 840        30,3025   02257 0                  SINCDU +2
 0106                           30,3026   77621 1          BDSU
 0107                           30,3027   77671 1          DDV
 0108   REF   2 LAST 840        30,3030   02253 1                  COSCDU +4
 0109                           30,3031   00025 0          STORE  20D             DCDU
 0110                           30,3032   72405 0          DMP    SL1             SCALE
 0111   REF   7 LAST 840        30,3033   02261 0                  SINCDU +4
 0112                           30,3034   77621 1          BDSU
 0113                           30,3035   00015 0                  12D             DTHETASM +2
 0114                           30,3036   14027 1          STODL  22D             DCDU +2
 0115                           30,3037   00013 0                  10D             DTHETASM
 0116                           30,3040   65205 0          DMP    PDDL
 0117   REF   8 LAST 840        30,3041   02257 0                  SINCDU +2
```

L FIND CDU DESIRED USER'S OWN PAGE NO. 4 S3 E4

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 0118                          30,3042  00017 1                 14D             DITHETASM +4
 0119                          30,3043  43205 1          DMP    DAD
 0120   REF   3 LAST 840       30,3044  02251 0                 COSCDU +2
 0121                          30,3045  77752 1          SLI    SCALE
 0122                          30,3046  14031 0          STODL  24D             DCDU +4
 0123                          30,3047  00027 1                 22D             DCDU +2
 0124                          30,3050  57405 1          DMP    DCOMP
 0125   REF   9 LAST 840       30,3051  02261 0                 SINCDU +4       DCDUX =-DCDUY*SIN(CDUZ)
 0126                          30,3052  77752 1          SLI    SCALE
 0127                          30,3053  00025 0          STORE  20D             DCDU
 0128                          30,3054  53375 0          VLOAD  VAD
 0129                          30,3055  00025 0                 20D             DCDU
 0130   REF  10 LAST 838       30,3056  01331 1                 CDUTEMP
 0131                          30,3057  77634 0          RTB
 0132   REF   5 LAST 726       30,3060  33526 0                 V1S1025         SCALE FROM 1,S TO 2,S
 0133   REF  16 LAST 735       30,3061  00767 1          STORE  CDUXD
 01341                         30,3062  77650 1          GOTO
 01342  REF   2 LAST 839       30,3063  01304 1                 RETSAVE
R0135
R0136
R0137  SINCOSCD    COMPUTES SIN AND COS OF CDU  AND STORES AS DP VECTORS
R0138  SINCDU ,COSCDU
R0139  INPUT IS CDUS AS A VECTOR CDUTEMP
R0140  OUTPUT IS SIN AND COS OF CDU,S
R0141  CDUS ARE AVAILABLE IN 2,S COMP
R0142  SIN AND COS ARE SCALED TO 2
R0143  SINCOSCD CAN BE ENTERED FROM INTERPRETIVE
R0144
R0145
R0146
 0147                          30,3064  76131 0  SINCOSCD SSP    AXT,1           SET X1 TO 6
 0148   REF  32 LAST 840       30,3065  00051 0                 S1              SET S1 TO 2
 0149                          30,3066  00002 0          DCI    2
 0150                          30,3067  00006 1          DCI    6
 0151                          30,3070  47133 0  REPEAT1  VLOAD* RTB
 0152   REF  11 LAST 841       30,3071  01337 1                 CDUTEMP +6,1
 0153   REF  15 LAST 654       30,3072  33457 1                 CDULOGIC        CONVERT CDU FROM 2,S TO 1,S.  SCALE
 0154   REF  12 LAST 841       30,3073  05337 0          STORE  CDUTEMP +6,1    TO ONE REVOLUTION
 0155                          30,3074  77756 0          SIN
 0156   REF  10 LAST 841       30,3075  06263 0          STORE  SINCDU +6,1
 0157                          30,3076  71543 0          DLOAD* COS
 0158   REF  13 LAST 841       30,3077  01337 1                 CDUTEMP +6,1
 0159   REF   4 LAST 841       30,3100  06255 0          STORE  COSCDU +6,1
 0160                          30,3101  43500 0          TIX,1  RVQ
 0161   REF   1                30,3102  61070 1                 REPEAT1
```

L AVERAGE G INTEGRATOR USER'S OWN PAGE NO. 1 S3

```
R0001  ***************************************************************************************************************

R0003          ROUTINE CALCRVG INTEGRATES THE EQUATIONS OF MOTION BY AVERAGING THE THRUST AND GRAVITATIONAL
R0005  ACCELERATIONS OVER A TIME INTERVAL OF 2 SECONDS.

R0006          FOR THE EARTH-CENTERED GRAVITATIONAL FIELD, THE PERTURBATION DUE TO OBLATENESS IS COMPUTED TO THE FIRST
R0008  HARMONIC COEFFICIENT J.

R0015          ROUTINE CALCRVG REQUIRES...
R0016                1) THRUST ACCELERATION INCREMENTS IN DELV SCALED SAME AS PIPAX,Y,Z
R0018                2) VN SCALED 2(+7)M/CS.
R0019                3) PUSHDOWN COUNTER SET TO ZERO.
R0023  IT LEAVES RN1 UPDATED (SCALED AT 2(+24)M, VN1 (SCALED AT 2(+7)M/CS), AND GDT1/2 (SCALED AT 2(+7)M/CS).
R0025

 0029                                    30,3103          BANK   30
 0030  REF  10 LAST  42                      E5          EBANK= EVEX

 0031                          30,3103   77656 1  CALCGRAV UNIT                    ENTER WITH RN AT 2(+24)M IN VAC
 0032  REF   4 LAST 737        30,3104   01033 0          STORE  UNITR
 0036                          30,3105   41441 0          DOT    PUSH
 0037  REF   1                 30,3106   01041 0                 UNITW
 0038                          30,3107   56316 0          DSU    DDV
 0039  REF   1                 30,3110   21171 0                 DP1/10
 0040                          30,3111   65221 0          BDSU   PDDL
 0041  REF   1                 30,3112   21167 1                 DP1/81H
 0042                          30,3113   00045 0                 36D
 00425 REF   4 LAST 737        30,3114   15047 0          STODL  RMAG
 0043  REF   1                 30,3115   21173 1                 J(RE)SQ
 00435                         30,3116   77671 1          DDV
 0044                          30,3117   00043 0                 34D
 0045                          30,3120   00041 1          STORE  32D
 0046                          30,3121   77605 1          DMP
 0047                          30,3122   65361 0          VXSC   PDDL
 0048  REF   5 LAST 842        30,3123   01033 0                 UNITR
 0049                          30,3124   74205 0          DMP    VXSC
 0050                          30,3125   00041 1                 32D
 0051  REF   2 LAST 842        30,3126   01041 0                 UNITW
 0052                          30,3127   53255 0          VAD    VAD
 0053  REF   6 LAST 842        30,3130   01033 0                 UNITR
 0054                          30,3131   56325 0          PDDL   DDV
 0055  REF   1                 30,3132   21175 1                 -MUDT
 0056                          30,3133   00043 0                 34D
 0057                          30,3134   45561 1          VXSC   STADR
 0058  REF   1                 30,3135   76712 1          STORE  GDT1/2

 0060                          30,3136   77616 0          RVQ

 0061                          30,3137   74375 0  CALCRVG VLOAD  VXSC
 0062  REF   6 LAST 839        30,3140   00404 1                 DELV
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L AVERAGE G INTEGRATOR USER'S OWN PAGE NO. 2 53 E5

```
0063   REF   2 LAST 685    30,3141   21165 0                    KPIP1
0064                       30,3142   44006 1          PUSH      STQ          DV/2 TO PD SCALED AT 2(+7)M/CS
0065                       30,3143   00037 0                    31D
0066                       30,3144   41455 0          VAD       PUSH         (DV-OLDGDT)/2 TO PD SCALED AT 2(+7)M/CS
0067   REF   4 LAST 829    30,3145   01025 1                    GDT/2
0068                       30,3146   74255 0          VAD       VXSC
0069   REF  12 LAST 740    30,3147   01017 0                    VN
0070   REF   1             30,3150   21177 0                    2SEC(17)
0071                       30,3151   77655 1          VAD
0072   REF  13 LAST 829    30,3152   01011 0                    RN
0073   REF   2 LAST 822    30,3153   35051 0          STCALL    RN1          TEMP STORAGE OF RN SCALED 2(+24)M
0074   REF   3 LAST 829    30,3154   61103 1                    CALCGRAV

0075                       30,3155   53255 0          VAD       VAD
0076                       30,3156   77655 1          VAD
0077   REF  13 LAST 843    30,3157   01017 0                    VN
0078   REF   1             30,3160   35057 0          STCALL    VN1          TEMP STORAGE OF VN SCALED 2(+7)M/CS
0079                       30,3161   00037 0                    31D

00795                      30,3162   03215 1  KPIP     2DEC      .1024        SCALES DELV TO 2(+4)
C00795                     30,3163   27057 0
0080                       30,3164   00150 0  KPIP1    2DEC      0.0064
C0080                      30,3165   33343 0
0081                       30,3166   04000 0  DP1/8TH  2DEC      0.125
C0081                      30,3167   00000 1
0082                       30,3170   03146 1  DP1/10   2DEC      0.1
C0082                      30,3171   14632 0
0083                       30,3172   00036 1  J(RE)SQ  2DEC      0.060066630 B-5      SCALED AT 2(+45)
C0083                      30,3173   30103 0
0084                       30,3174   77774 0  -MUDT    2DEC*     -7.9720645 E+12 B-59*
C0084                      30,3175   53772 0
0085                       30,3176   00031 0  2SEC(17) 2DEC      200 B-17
C0085                      30,3177   00000 1
00852                      30,3200   04000 0  DP2(-3)  2DEC      0.125
C00852                     30,3201   00000 1
00854                      30,3202   00224 0  MUEARTH  2DEC      0.009063188      3.98603223 E14 SCALED AT 2(42)M(3)/CS(2)
C00854                     30,3203   17561 0
00856                      30,3204   00164 1  MUMOON   2DEC      0.001134481      4.90277800 E12 SCALED AT 2(36)M(3)/CS(2)
C00856                     30,3205   34414 1
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L MASS CALCULATOR USER'S OWN PAGE NO. 1 S3

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0001                                30,3206          BANK   30
R0002   * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

R0003       THE MASS UPDATE ROUTINE EXTENDS FROM APPROXIMATELY HERE TO THE NEXT
R0004   ROW OF ASTERISKS.   COMPUTATIONS ARE AS FOLLOWS:-
R0005       (1) /AF/ = MAGNITUDE DV/DT, SCALED IN UNITS OF 2(-5) M/CS/CS.
R0006       (2) PREFORCE = /AF/ MASS, APPROXIMATE PRESENT THRUST, SCALED AT
R0007           SOME 3.3 POUNDS PER BIT; PREFORCE LATER BECOMES PREFORCE/2FMAX.
R0008       (3) NOMINAL EXHAUST VELOCITY, VEXNOM = VEXSTEP + (PREFORCE-FSTEP)
R0009           SLOPE, WHERE VEXSTEP, FSTEP, AND SLOPE ARE SELECTED FROM THE
R0010           'VEXTABLE' BY THE ROUTINE BEGINNING AT VEXFINDD; THE FSTEPS
R0011           AND VXSTEPS DEFINE CERTAIN DISCRETE POINTS ON THE CURVE OF
R0012           EXHAUST VELOCITY VERSUS THRUST; THE ASSOCIATED SLOPE IS ALWAYS
R0013           THAT FOR THE SEGMENT JUST PRECEEDING THOSE POINTS.   (UNITS
R0014           FOR VEXNOM, AS FOR NEGVEX, ARE 2(6) M/CS.)
R0015       (4) AREARATE, A MODERATELY ABSTRUSE (NOT TO SAY ABSURD) FUNCTION
R0016           OF DELAREA (EROSION) AND PREFORCE.   (THE AREA IN QUESTION IS
R0017           THAT OF THE THROAT OF THE ENGINE.)
R0018       (5) DELAREA = DELAREA + AREARATE DELTAT, SCALED IN UNITS OF 2(7) *
R0019       (6) NEGVEX = -(VEXNOM - CVEX5 DELAREA).
R0020       (7) MASS = MASS + (/DELV//NEGVEX) MASS, SCALED IN UNITS OF 2(15)
R0021           KILOGRAMS.

R0022       THE FOLLOWING INITIALIZATIONS MUST BE MADE BEFORE LAUNCH:
R0023   C(MASS) = 0, C(LEMMASS1) = SCALED MASS OF LEM CUM DPS, C(LEMMASS2) =
R0024   SCALED MASS OF LEM WITHOUT DPS.   UPON LEM-SIVB SEPARATION MASS MUST
R0025   BE REINITIALIZED USING LEMMASS1 AND DELAREA MUST BE SET TO DP ZERO.
R0026   LATER, WHEN THE DPS PARTS COMPANY, MASS MUST BE INITIALIZED STILL
R0027   AGAIN USING LEMMASS2.

R0028       THE FOLLOWING IS AN INELEGANT SUPERFLUITY:-   INPUTS: MASS, DELAREA,
R0029   DELV, DELTAT, EMANATIONS FROM THE VEXTABLE, A TABLESPOON OF SALT AND
R0030   SEVEN BYZANTINE DODO EGGS.   OUTPUTS: /AF/ AND MASS.   DEBRIS: PREFORCE,
R0031   NEGVEX, AND AREARATE (TO LEARN MORE ABOUT THESE GEMS, SEE ABOVE).
R0032   SUBROUTINES CALLED: MASSMULT (A PART OF THROTTLE CONTROL) AND THE
R0033   INTERPRETER.   ERASABLES: BANK 5 AT PRESENT.   EYLES WROTE THIS STUFF;
R0034   HIS LAST MODIFICATION THEREOF (NUMBER N+2) WENT INTO AGC REVISION 20.

0035                        30,3206   43145 0  MASSMON  DLOAD   BOFF
0036    REF   8 LAST 822    30,3207   01321 0           MASS
0037    REF   1             30,3210   00753 0           SIVBGONE
0038    REF   1             30,3211   61373 1           NOMASS
0039                        30,3212   74375 0           VLOAD   VXSC
0040    REF   7 LAST 842    30,3213   00404 1           DELV              DV = DELV*KPIP SCALED AT 2(+4) M/CS
0041    REF   1             30,3214   21163 0           KPIP
0042                        30,3215   51406 1           PUSH    ABVAL     DV IN PDL
0043    REF   1             30,3216   03624 1           STORE   ABDVCONV
0044                        30,3217   56206 0           PUSH    DDV
0045    REF   1             30,3220   21400 0           2SEC(9)
0046    REF   1             30,3221   01325 1           STORE   /AF/      /AF/ = MAGNITUDE DV/DT
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0047                          30,3222   77776 1          EXIT

0048   REF   1                30,3223   3 3444 0         CA      ETHROTL
0049   REF  56 LAST 839       30,3224   54 003 0         TS      EBANK       JUST TO INSURE HAVING THE PROPER EBANK
0050   REF  16 LAST 751                   E5             EBANK=  ETHROT

0051                          30,3225   0 0006 1         EXTEND
0052   REF   2 LAST 844       30,3226   3 1325 1         DCA     7AF7
0053   REF   1                30,3227   0 3445 1         TC      MASSMULT    WHICH PRODUCES DP FORCE IN A AND L
0054   REF   1                30,3230   53'546 0         DXCH    PREFORCE

0055   REF   2 LAST 845       30,3231   4 1545 0  CHOICE1 CS      PREFORCE    TEST PREFORCE TO SEE IF
0056   REF   1                30,3232   6 3401 1         AD      LOWFCRIT      EITHER BIG ENGINE IS ON
0057                          30,3233   0 0006 1         EXTEND
0058   REF   1                30,3234   6 3241 0         BZMF    CHOICE2     BRANCH IF PREFORCE > LOWFCRIT = 720 LBS.

0059                          30,3235   0 0006 1  VEXFINDR EXTEND              OTHERWISE, USE RCSVEX
0060   REF   1                30,3236   4 3404 0         DCS     RCSVEX
0061   REF   1                30,3237   53'556 1         DXCH    NEGVEX
0062   REF   1                30,3240   1 3252 0         TCF     MININIT
0063                          30,3241   0 0006 1  CHOICE2 EXTEND
0064                          30,3242   00 030 1         READ    30
0065                          30,3243   4 0000 0         COM
0066   REF  32 LAST 822       30,3244   7 7762 1         MASK    BIT2
0067                          30,3245   0 0006 1         EXTEND
0068   REF   1                30,3246   1 3256 1         BZF     VEXFINDD
0069                          30,3247   0 0006 1  VEXFINDA EXTEND              OTHERWISE, USE APSVEX
0070   REF   1                30,3250   4 3406 1         DCS     APSVEX
0071   REF   2 LAST 845       30,3251   53'556 1         DXCH    NEGVEX
0072                          30,3252   0 0006 1  MININIT EXTEND
0073   REF   1                30,3253   3 3415 1         DCA     MINMASSA
0074   REF   1                30,3254   53'564 0         DXCH    MINIMASS
0075   REF   1                30,3255   1 3351 1         TCF     ENDVEX

0076                          30,3256   0 0006 1  VEXFINDD EXTEND
0077   REF   1                30,3257   3 3417 0         DCA     MINMASSD
0078   REF   2 LAST 845       30,3260   53'564 0         DXCH    MINIMASS

0079   REF 242 LAST 839       30,3261   3 7767 0         CA      ZERO
0080   REF   1                30,3262   55'544 1         TS      VEXDEX
0081   REF  25 LAST 810       30,3263   3 7761 0  VEXLOOP CA     FOUR
0082   REF   2 LAST 845       30,3264   27'544 1         ADS     VEXDEX      INCREMENTING VEXDEX BY FOUR
0083   REF   3 LAST 845       30,3265   4 1545 0         CS      PREFORCE
0084   REF   3 LAST 845       30,3266   51'544 0         INDEX   VEXDEX
0085   REF   1                30,3267   6 3414 0         AD      FSTEP       FSTEP = PREFORCE IN A AND L
0086                          30,3270   0 0006 1         EXTEND
0087   REF   1                30,3271   6 3263 0         BZMF    VEXLOOP     BRANCH IF PREFORCE > OR = FSTEP.  EMERGE
A0088                                                                        FROM LOOP WITH INDEX PROPERLY SET AS
A0089                                                                        SOON AS FSTEP > PREFORCE.
0090                          30,3272   4 0000 0         COM                 PREFORCE-FSTEP (ALWAYS MINUS) IN A AND L
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L MASS CALCULATOR USER'S OWN PAGE NO. 3 S3 E5

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0091                                30,3273  0 0006 1          EXTEND
0092  REF   4 LAST 845             30,3274  5 1544 0          INDEX   VEXDEX
0093  REF   1                       30,3275  7 3415 0          MP      SLOPE
0094  REF   1                       30,3276  53'550 1          DXCH    VEXNUM
0095                                30,3277  0 0006 1          EXTEND
0096  REF   5 LAST 846             30,3300  5 1544 0          INDEX   VEXDEX
0097  REF   1                       30,3301  3 3417 0          DCA     VEXSTEP
0098  REF   2 LAST 846             30,3302  21'550 1          DAS     VEXNUM      VEXNUM = VEXSTEP + (PREFORCE-FSTEP)SLOPE

0099  REF   1                       30,3303  4 3700 1          CS      -FMAX
0100                                30,3304  6 0000 1          DOUBLE
0101  REF 237 LAST 836              30,3305  56 002 0          XCH     Q
0102                                30,3306  0 0006 1          EXTEND
0103  REF   4 LAST 845             30,3307  3 1546 1          DCA     PREFORCE
0104                                30,3310  0 0006 1          EXTEND
0105  REF 238 LAST 846              30,3311  10 002 1          DV      Q
0106  REF   5 LAST 846              30,3312  55'545 0          TS      PREFORCE    PREFORCE = PREFORCE/2FMAX

0107  REF   1                       30,3313  3 3412 0          CA      CVEX4
0108                                30,3314  0 0006 1          EXTEND
0109  REF   3 LAST 822              30,3315  7 1551 0          MP      DELAREA
0110  REF   1                       30,3316  6 3411 0          AD      CVEX3
0111                                30,3317  0 0006 1          EXTEND
0112  REF   6 LAST 846              30,3320  7 1545 0          MP      PREFORCE
0113                                30,3321  0 0006 1          EXTEND                  MUMBO
0114  REF   7 LAST 846              30,3322  7 1545 0          MP      PREFORCE        JUMBO
0115  REF   1                       30,3323  53'554 0          DXCH    AREARATE
0116  REF   1                       30,3324  3 3410 1          CA      CVEX2
0117                                30,3325  0 0006 1          EXTEND
0118  REF   4 LAST 846              30,3326  7 1551 0          MP      DELAREA
0119  REF   1                       30,3327  6 3407 1          AD      CVEX1
0120                                30,3330  0 0006 1          EXTEND
0121  REF   8 LAST 846              30,3331  7 1545 0          MP      PREFORCE
0122  REF   2 LAST 846              30,3332  21'554 0          DAS     AREARATE    NOW SCALED IN UNITS OF 2(-2) PERCENT/CS
0123  REF   3 LAST 846              30,3333  3 1553 0          CA      AREARATE
0124                                30,3334  0 0006 1          EXTEND
0125  REF   2 LAST 844              30,3335  7 3377 0          MP      2SEC(9)
0126  REF   2 LAST 822              30,3336  53'560 1          DXCH    DAREATMP
0127                                30,3337  0 0006 1          EXTEND
0128  REF   5 LAST 846              30,3340  3 1552 1          DCA     DELAREA
0129  REF   3 LAST 846              30,3341  21'560 1          DAS     DAREATMP    DAREATMP NOW CONTAINS NEW DELAREA
0130  REF   4 LAST 846              30,3342  3 1557 1          CA      DAREATMP
0131                                30,3343  0 0006 1          EXTEND
0132  REF   1                       30,3344  7 3413 0          MP      CVEX5
0133  REF   3 LAST 845              30,3345  53'556 1          DXCH    NEGVEX      RESULT IS SCALED IN UNITS OF 2(6) M/CS
0134                                30,3346  0 0006 1          EXTEND
0135  REF   3 LAST 846              30,3347  4 1550 1          DCS     VEXNUM
0136  REF   4 LAST 846              30,3350  21'556 1          DAS     NEGVEX      NEGVEX NOW HOLDS THE GENUINE ARTICLE

0137  REF 243 LAST 845              30,3351  3 7767 0 ENDVEX   CA      ZERO        PRECAUTIONARY
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```
 0138  REF   3 LAST 724     30,3352  54 153 1          TS      MODE
 0139  REF   8 LAST 304     30,3353  54 111 1          TS      OVFIND

 0140  REF  82 LAST 839     30,3354  0 6112 0          TC      INTPRET
 0141                       30,3355   60545 0          DLOAD   SR2          RESCALING /DELV/ TO 2(6) M/CS
 0142                       30,3356   41271 0          DDV     DMP
 0143  REF   5 LAST 846     30,3357   02556 0                  NEGVEX
 0144  REF   9 LAST 844     30,3360   01321 0                  MASS
 0145                       30,3361   77615 0          DAD
 0146  REF  10 LAST 847     30,3362   01321 0                  MASS
 0147  REF   2 LAST 822     30,3363   02562 1          STORE   MASSTEMP
 0148                       30,3364   51025 1          BZE     BPL          RETURN NOW IF MASS > MINIMASS
 0149  REF   3 LAST 845     30,3365   02564 1                  MINIMASS
 0150  REF   2 LAST 735     30,3366   00052 0                  QPRET
 0151                       30,3367   77745 1          DLOAD                OTHERWISE SET MASS = MINIMASS
 0152  REF   4 LAST 847     30,3370   02564 1                  MINIMASS
 0153  REF   3 LAST 847     30,3371   02562 1          STORE   MASSTEMP
 0154                       30,3372   77616 0          RVQ

 0155  REF   4 LAST 847     30,3373   16562 1  NOMASS  STODL   MASSTEMP
 0156  REF   2 LAST 701     30,3374   26643 1          DPD
 0157  REF   5 LAST 846     30,3375   02560 0          STORE   DELAREA1MP   DELAREA INITIALIZED UNTIL SIVB SEPARATES
 0158                       30,3376   77616 0          RVQ

K0159  * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * * *

A0160                                                                       * * * * * * * * * * * * * * * * * * * *

A0161                                                                       CONSTANTS FOR VEXFIND1

 0162                       30,3377   14400 0  2SEC(9) 2DEC    200 B-9      CONSTANT GUIDANCE PERIOD, SUP70S5DLY
C0162                       30,3400   00000 1

 0163                       30,3401   00411 0  LOWFCRIT DEC    411          ABOUT 720 POUNDS, SCALED
 0164                       30,3402   05423 1  MASSCRIT DEC    .173031964   MASS OF LEM WITH DPS > MASSCRIT > MASS
A0165                                                                         OF LEM WITHOUT DPS

 0166                       30,3403   15165 1  RCSVEX  2DEC    .4134375     EXHAUST VELOCITY FOR RCS JETS
C0166                       30,3404   30244 0
 0167                       30,3405   17114 0  APSVEX  2DEC    .473441550   EXHAUST VELOCITY FOR ASCENT ENGINE
C0167                       30,3406   33562 0
 0168                       30,3407   00316 0  CVEX1   DEC     +.012558840
 0169                       30,3410   76221 1  CVEX2   DEC     -.053575066
 0170                       30,3411   77312 1  CVEX3   DEC     -.018875329
 0171                       30,3412   02447 1  CVEX4   DEC     +.080517427
 0172                       30,3413   01503 0  CVEX5   DEC     +.05099460
```

L MASS CALCULATOR USER'S OWN PAGE NO. 5 53 E5

```
 0173                    30,3414  02035 0  MINMASSA 2DEC   2106.4833 B-15   MASS OF APS EMPTY
C0173                    30,3415  07567 1
 0174                    30,3416  06062 0  MINMASSD 2DEC   6245 B-15        DESCENT WITH NO DPS FUEL AND 405 RCS
A0175                    30,3417  20000 0

A0176                                                                      ADDRESSES FOR ACCESSING VEXTABLE

 0177  REF  1                    30,3414  FSTEP    =      FSTEP1 -4
 0178  REF  1                    30,3415  SLOPE    =      SLOPE1 -4
 0179  REF  1                    30,3416  VEXSTEP  =      VXSTEP1 -4

A0180                                                                      THE VEXTABLE

 0181                    30,3420  01713 0  FSTEP1   DEC    +.0592346907      25%
 0182                    30,3421  11736 0  SLOPE1   DEC    +.3104172317
 0183                    30,3422  16445 0  VXSTEP1  2DEC   +.4553963093     ABOUT 2914.53 M/S
C0183                    30,3423  06644 1

 0184                    30,3424  03625 0  FSTEP2   DEC    +.1184693815      50%
 0185                    30,3425  76531 1  SLOPE2   DEC    -.0413889642
 0186                    30,3426  16375 1  VXSTEP2  2DEC   +.4529446468     ABOUT 2898.84 M/S
C0186                    30,3427  01343 1

 0187                    30,3430  06275 1  FSTEP3   DEC    +.1990285610      84%
 0188                    30,3431  06741 0  SLOPE3   DEC    +.2168355664
 0189                    30,3432  17033 1  VXSTEP3  2DEC   +.4704127421     ABOUT 3010.64 M/S
C0189                    30,3433  07603 0

 0190                    30,3434  07100 1  FSTEP4   DEC    +.2226276618      93%
 0191                    30,3435  76601 1  SLOPE4   DEC    -.0389579859
 0192                    30,3436  17014 1  VXSTEP4  2DEC   +.4694933687     ABOUT 3004.75 M/S
C0192                    30,3437  05573 0

 0193                    30,3440  37777 1  HIFSTEP  DEC    +.9999999999     JUST IN CASE, ANOMALOUSLY,
 0194                    30,3441  00000 1  HISLOPE  DEC    +.0000000000       PREFORCE APPEARS TO
 0195                    30,3442  17014 1  HIVXSTEP 2DEC   +.4694933687       EXCEED 100%.
A0196                    30,3443  05573 0                                  * * * * * * * * * * * * * * * * * * * * *

 0197  REF  17 LAST 845  30,3444  02565 0  ETHROTL  ECADR  ETHROT
```

L THROTTLE CONTROL USER'S OWN PAGE NO. 1 53

R0001 THROTTLE CONTROL CAN BE USED IN EITHER OF TWO MODES: IN "PERCENTAGE MODE" (WHEN A CERTAIN FRACTION OF
R0003 MAXIMUM THRUST IS DESIRED) AND IN "ACCELERATION MODE" (WHEN THE THRUST DESIRED IS THAT CORRESPONDING TO A
R0005 SPECIFIED ACCELERATION).

R0006 PERCENTAGE MODE

R0008 THE FRACTION OF MAXIMUM THRUST (NOMINALLY
R0010 10500 POUNDS) DESIRED, IN SINGLE PRECISION, IS
R0012 PLACED IN PCNTF. ENTRY IS VIA A DTCB AN THE
R0014 2CADR OF PCNTFMAX. THE ROUTINE BEGINNING AT
R0016 PCNTFMAX SETS UP A JOB - PCNTJOB - AND RETURNS
R0018 TO THE USER (AT THE INSTRUCTION IMMEDIATELY
R0020 FOLLOWING THE DTCB).
R0022
R0024 PCNTJOB, AFTER A RESTART PROTECT,
R0026 TURNS OFF THE TRIM GIMBAL, SETS UP A WAITLIST
R0028 TASK (DESCRIBED LOCALLY), COMPUTES THRUST DESIRED,
R0030 FC = PCNTF FMAX, SCALED AT ABOUT 2.7 POUNDS PER BIT,
R0032 AND TCF'S AROUND THE COMMENCEMENT OF ACCLJOB TO
R0034 FOLDCALC.

ACCELERATION MODE

DESIRED ACCELERATION, IN DOUBLE PRECISION,
IN UNITS OF 2(-5) M/CS/CS, IS PLACED IN /ACF/.
ENTRY IS VIA A DTCB ON THE 2CADR OF THROTCON.
THE ROUTINE BEGINNING AT THROTCON SETS UP A JOB -
ACCLJOB - AND RETURNS TO THE USER (AT THE
INSTRUCTION FOLLOWING THE DTCB).

ACCLJOB, AFTER A RESTART PROTECT,
COMPUTES DESIRED ACCELERATION, FC = /ACF/ MASS,
SCALED AT ABOUT 2.7 POUNDS PER BIT.

(NOTE THAT IN THE ACCELERATION MODE THE TRIM
GIMBAL IS NOT TURNED OFF; IT IS ASSUMED TO BE OFF
BY THE TIME THROTTLE CHANGES ARE COMMANDED.

R0036 FOLDCALC BEGINS BY COMPUTING PRESENT THRUST, FOLD = MASS /AF/, SCALED AS IS FC. NEXT, SINCE /AF/ IS
R0038 MERELY AN "AVERAGE" OF THE THROTTLE LEVELS OF THE PRECEEDING PIPA INTERVAL, FOLD IS WEIGHTED BY FWEIGHT, A
R0040 FUNCTION OF THE PRECEEDING THROTTLE COMMAND (DESCRIBED LOCALLY). TO PRECLUDE A SPURIOUS WEIGHTING THAT WOULD
R0042 OTHERWISE OCCUR, FWEIGHT IS ZEROED 1.95 SECONDS AFTER EVERY PERCENTAGE MODE THROTTLING.

R0044 NEXT, TO COMPENSATE FOR THE DIFFERENTIAL BETWEEN BITS FOR MAXIMUM THRUST AND BITS FOR FULL THROTTLE, THE
R0046 NUMBER FOLD - FODD IS COMPUTED AND SET INTO PIPFSET WHENEVER FCOLD INDICATES THE THROTTLE IS AT MAXIMUM.
R0048 SINCE PIPFSET IS USED, RATHER THAN PIF, PIF STILL REFLECTS ACCURATELY THE ACTUAL THRUST CHANGE AND FWEIGHT IS
R0050 COMPUTED PROPERLY.

R0051 NEXT COMES IS-IT-ON. HERE THE ENGINE-OFF BIT (14 OF CHANNEL 11) IS QUERIED: IF THE ENGINE IS OFF
R0053 FCOLD, THE SINGLE PRECISION HISTORY REGISTER, IS SET TO 10% FMAX AND PIPFSET, A PRESETTING ADDED TO PIF AT
R0055 THE LAST MOMENT, IS SET TO -10% FMAX TO COMPENSATE FOR THE ASSUMED SETTING OF THE MANUAL THROTTLE.

R0057 THE SERIES OF DECISIONS BEGINNING AT WHERETO CAUSES THE THROTTLE TO REACT TO USERS' DESIRES IN THE
R0059 MANNER DESCRIBED BY FIGURE 5.3-5 OF THE FLIGHT 206 GSOP. WHERETO PROCEEDS (OR BRANCHES) TO FLATOUT (IF THE
R0061 THROTTLE LEVEL ASKED FOR IS IN THE FORBIDDEN REGION) OR TO DOPIF. FLATOUT RESETS FC TO 94% FMAX, SETS FEXTRA
R0063 (A BOOST GIVEN TO THE THROTTLE TO KEEP IT JAMMED AGAINST ITS STOPS) INTO PIPFSET, AND PROCEEDS TO DOPIF.

R0065 DOPIF, AFTER A "TYPE C" RESTART PROTECT (NECESSITATED BY THE FACT THAT FCOLD AND PIF, USED EARLIER, ARE
R0067 ABOUT TO BE MODIFIED), SETS FCOLD = FC, COMPUTES PIF (PULSE INCREMENT FOR ACCELERATION) = FC - FOLD, AND, AS
R0069 IT PROCEEDS TO DOIT, HAS THIS NUMBER PLUS PIPFSET IN A & L.

R0070 DOIT DOES IT. IT TS'S INTO THRUST, THE CHANNEL (55) LEADING TO DECA, THE THROTTLE-AGC INTERFACE
R0072 CIRCUIT, AND SETS BIT 4 IN CHANNEL 11, THE SIGNAL FOR THRUST TO BE COUNTED DOWN (AT 3200 PPS). FINALLY,
R0074 FWEIGHT = F(PIF) IS COMPUTED FOR USE NEXT PASS.

R0075 AFTER ANOTHER RESTART PROTECT A TCF ENDOFJOB ENDS THROTTLE CONTROL.

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```
 0077                                  30,3445          BANK   30
 0078   REF  18 LAST 848                  E5           EBANK= ETHROT


A0079                                                  ***************
A0080                                                  * SUBROUTINES *
A0081                                                  ***************

A0082                                                  THIS SUBROUTINE MULTIPLIES ACCELERATION
A0083                                                  (ARRIVING IN A AND L) BY MASS AND LEAVES
A0084                                                  FORCE (THRUST) IN A & L, SCALED AT ABOUT
A0085                                                  2.7 POUNDS PER BIT.

 0086                                  30,3445  0 0006 1 MASSMULT EXTEND
 0087   REF  23 LAST 365               30,3446  22 120 1          DXCH   BUF          PRESERVING RETURN ADDRESS
 0088   REF 297 LAST 839               30,3447  52 145 0          DXCH   MPAC
 0089   REF   8 LAST 273               30,3450  0 7155 1          TC     DMP          LEAVES ODDLY SCALED FORCE IN MPAC
 0090   REF  11 LAST 847               30,3451   01320 1          ADRES  MASS
 0091   REF   9 LAST 850               30,3452  0 7155 1          TC     DMP          LEAVES PROPERLY SCALED FORCE IN MPAC
 0092   REF   1                        30,3453   03533 1          ADRES  SCALEFAC
 0093   REF 298 LAST 850               30,3454  52 146 0          DXCH   MPAC +1      LOADING FORCE INTO A AND L
 0094   REF  24 LAST 850               30,3455  0 0120 1          TC     BUF          IN WHICH Q WAS STORED


A0095                                                  THIS TASK WILL BE EXECUTED 1.95 SECONDS
A0096                                                    AFTER PERCENTAGE MODE THROTTLING.

 0099   REF 244 LAST 846               30,3456  4 7767 1 PCNTOVER CS     ZERO
 0100   REF   1                        30,3457  55'576 0          TS     FWEIGHT        SCHEME WILL WORK PROPERLY NEXT PASS
 0101   REF   2 LAST 850               30,3460  55'577 1          TS     FWEIGHT +1
 0102                                  30,3461  22 007 0          ZL                    -0 STILL IN A
 0103   REF   6 LAST  94               30,3462  53'100 0          DXCH   -PHASE1
 0104   REF 114 LAST 836               30,3463  1 5727 1          TCF    TASKOVER


A01041                                                 ----------------------------------------------------------------------
 01042                                 30,3464   00303 1 THROTDT  DEC    +195
 01043                                 30,3465   00310 0 PGUID    DEC    +200
A01044                                                 ----------------------------------------------------------------------
```

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P0105
A0106                                                          **********
A0107                                                          * ENTRIES *
A0108                                                          **********

A0109                                                          THIS ENTRY SETS UP A JOB WHICH WILL
A0110                                                          DELIVER A SPECIFIED FRACTION OF MAXIMUM
A0111                                                          THRUST.  THIS FRACTION ARRIVES (SP) IN
A0112                                                          REGISTER PCNTF.

 0113  REF   1              30,3466  53'575 0  PCNTFMAX DXCH   RTNHOLD   RETAINING ZCADR FOR RETURN TO USER
 0114  REF   3 LAST 214     30,3467  3 5647 1           CAF    PRIO25
 0115                       30,3470  0 0004 0           INHINT
 0116  REF  31 LAST 823     30,3471  0 5505 1           TC     NOVAC
 0117  REF  19 LAST 850                 E5              EBANK= ETHROT
 0118                       30,3472    03507 0          ZCADR  PCNTJOB
C0118  REF   2 LAST  67     30,3473    60065 1
 0119                       30,3474  0 0003 1           RELINT
 0120  REF   1              30,3475  1 3505 0           TCF    AWAY

A0121                                                          NORMAL ENTRY FROM GUIDANCE EQUATIONS:
A0122                                                          THE JOB SET UP HERE DELIVERS A THRUST
A0123                                                          CORRESPONDING TO THE DESIRED MAGNITUDE
A0124                                                          OF THRUST-ACCELERATION.  THIS VALUE
A0125                                                          ARRIVES (DP) IN /ACF/, SCALED IN UNITS
A0126                                                          OF 2(-5) M/CS/CS.

 0127  REF   2 LAST 851     30,3476  53'575 0  THROTCON DXCH   RTNHOLD   RETAINING ZCADR FOR RETURN TO USER
 0128  REF  10 LAST 803     30,3477  3 5210 1           CAF    PRIO30
 0129                       30,3500  0 0004 0           INHINT
 0130  REF  32 LAST 851     30,3501  0 5505 1           TC     NOVAC
 0131  REF  20 LAST 851                 E5              EBANK= ETHROT
 0132                       30,3502    03540 0          ZCADR  ACCLJOB
C0132  REF   2 LAST  67     30,3503    60065 1
 0133                       30,3504  0 0003 1           RELINT

A0134                                                          THIS RETURN IS COMMON TO BOTH ENTRIES.

 0135  REF   3 LAST 851     30,3505  53'575 0  AWAY     DXCH   RTNHOLD
 0136                       30,3506  52 006 0           DTCB
```

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P0137
A0138                                                          ***************
A0139                                                          * COMPUTATION *
A0140                                                          ***************

 0141                    30,3507  0 0004 0  PCNJOB  INHINT                    SINCE THROTTLING IS ABOUT TO COMMENCE,

 0145  REF   1           30,3510  3 3464 1          CAF     THROTDT           SET UP A TASK TO ZERO FWEIGHT IN 2 SECS
 0146  REF 121 LAST 833  30,3511  0 5663 1          TC      WAITLIST
 0147  REF  21 LAST 851                 E5         EBANK=  ETHROT
 0148                    30,3512  03456 0          2CADR   PCNTOVER
C0148  REF   2 LAST  63  30,3513  60065 1
 0149  REF  46 LAST 803  30,3514  0 4141 1          TC      2PHSCHNG
 0150                    30,3515  40031 1          OCT     40031             1.35POT FOR PCNTOVER
 0151                    30,3516  05024 1          OCT     05024
 0152                    30,3517  25000 0          OCT     25000

 0155                    30,3520  0 0006 1          EXTEND
 0156  REF   2 LAST 846  30,3521  4 3701 0          DCS     -FMAX
 0157  REF 299 LAST 850  30,3522  52 145 0          DXCH    MPAC
 0158  REF   7 LAST 746  30,3523  3 1323 1          CA      PCNTP
 0159  REF   5 LAST 278  30,3524  0 7357 1          TC      SHORTMP
 0160  REF 300 LAST 852  30,3525  52 145 0          DXCH    MPAC              LOADING
 0161  REF   2 LAST 336  30,3526  53'571 1          DXCH    FC                STORING

 0162  REF 245 LAST 850  30,3527  3 7767 0          CA      ZERO              ZEROING FWEIGHT SINCE IT'S UNKNOWN
 0163  REF   3 LAST 850  30,3530  53'576 0          TS      FWEIGHT
 0164  REF   4 LAST 852  30,3531  53'577 1          TS      FWEIGHT +1
 0165  REF   1           30,3532  1 3547 0          TCF     FOLDCALC


A01651                                             ------------------------------------------------------------------------
 01652                    30,3533  00063 1  SCALEFAC 2DEC    +51.946987 B-14 QUASI-NEWTONS TO PULSE UNITS
C01652                    30,3534  36233 0
 01653                    30,3535  31000 0  2.PG.FRT DEC     12800             TWICE PGUID TIME PULSE RATE
 01654                    30,3536  74034 0  -LOCRIT  DEC     -2019             THE LOWER MID-SCALE CRITERION
 01655  REF   1                   30,3536  FEXTRA   =       -LOCRIT
 01656                    30,3537  00666 1  +FLOW    DEC     +438              MINIMUM ATTAINABLE THRUST
A01657                                             ------------------------------------------------------------------------

 0166  REF 122 LAST 833  30,3540  0 4161 0  ACCLJOB  TC      PHASCHNG
 0167                    30,3541  05024 1           OCT     05024
 0168                    30,3542  30000 1           OCT     30000

 0169                    30,3543  0 0006 1          EXTEND
 0170  REF   1           30,3544  3 1323 1          DCA     /ACF/
 0171  REF   2 LAST 845  30,3545  0 3445 1          TC      MASSMULT
 0172  REF   3 LAST 852  30,3546  53'571 1          DXCH    FC                FC = MASS /ACF/, SCALED
```

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```
0173                        30,3547  0 0006 1  FOLDCALC EXTEND
0174  REF  3 LAST 845      30,3550  3 1325 1            DCA     /AF/
0175  REF  3 LAST 852      30,3551  0 3445 1            IC      MASSMULT
0176  REF  1               30,3552  53'566 1            DXCH    FOLD          FOLD = MASS /AF/, SCALED

0177                        30,3553  0 0006 1            EXTEND
0178  REF  5 LAST 852      30,3554  3 1577 0            DCA     FWEIGHT       WEIGHTING FOLD BY FWEIGHT
0179  REF  2 LAST 853      30,3555  21'566 1            DAS     FOLD            AS COMPUTED LAST PASS

A0180                                                                        IF THE THROTTLE IS AT MAXIMUM, THE
A0181                                                                        QUANTITY -(FODD-FOLD)  IS COMPUTED AND
A0182                                                                        PUT INTO PIFPSET TO COMPENSATE FOR THE
A0183                                                                        DIFFERENCE BETWEEN THE NUMBER OF BITS
A0184                                                                        (I.E. PULSES) CORRESPONDING TO 100%
A0185                                                                        THROTTLE (FODD) AND THE NUMBER CORRES-
A0186                                                                        PONDING TO ACTUAL THRUST (FOLD).   THIS
A0187                                                                        COMPENSATION IS NEEDED IF THE THROTTLE
A0188                                                                        RETURNS TO THE THROTTLEABLE REGION THIS
A0189                                                                        PASS.   IF IT DOES NOT, PIFPSET IS RESET
A0190                                                                        IN FLATOUT.

0191  REF 246 LAST 852      30,3556  4 7767 1  FCOMPSET  CS      ZERO
0192  REF  1               30,3557  55'574 1            TS      PIFPSET
0193  REF  1               30,3560  4 3704 0            CS      +HICRIT
0194  REF  1               30,3561  6 1567 1            AD      FCOLD
0195                       30,3562  0 0006 1            EXTEND
0196  REF  1               30,3563  6 3567 0            BZMF    IS-IT-ON      BRANCH IF FCOLD < HICRIT, OTHERWISE
0197  REF  1               30,3564  4 3677 0            CS      +FODD           COMPUTE THE COMPENSATION NUMBER
0198  REF  3 LAST 853      30,3565  6 1565 0            AD      FOLD
0199  REF  2 LAST 853      30,3566  55'574 1            TS      PIFPSET

A0200                                                                        THIS ROUTINE CHECKS THE ENGINE-OFF BIT.
A0201                                                                        IF THE ENGINE IS OFF, FCOLD IS SET TO
A0202                                                                        10 PERCENT FMAX, AND, SINCE /AF/ DOES
A0203                                                                        NOT REFLECT THE SETTING OF THE MANUAL
A0204                                                                        THROTTLE, THAT SETTING (AROUND 12%) IS
A0205                                                                        PLACED NEGATIVELY IN PIFPSET.

0206  REF  35 LAST 852      30,3567  4 0075 1  IS-IT-ON  CS      FLAGWRD1
0207  REF  5 LAST 516       30,3570  7 7757 1            MASK    ENGINBIT
0209                       30,3571  0 0006 1            EXTEND
0210  REF  1               30,3572  1 3577 0            BZF     WHERETO       BRANCH HERE IF ENGINE IS ON
0211  REF  1               30,3573  3 3537 0            CA      +FLOW
0212  REF  2 LAST 853      30,3574  55'567 0            TS      FCOLD         SETTING FCOLD
0213  REF  2 LAST 853      30,3575  4 3537 1            CS      +FLOW
0214  REF  3 LAST 853      30,3576  55'574 1            TS      PIFPSET
```

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P0215
A0216                                                   ************
A0217                                                   * DECISION *
A0218                                                   ************

A0219                                                   THIS LOGIC DETERMINES THROTTLING IN THE
A0220                                                   REGION 10% - 94%.   THE MANUAL THROTTLE,
A0221                                                   SET TO MINIMUM BY MISSION PHASE PROGRMS,
A0222                                                   PROVIDES THE LOWER BOUND; A STOP IN THE
A0223                                                   ENGINE ITSELF PROVIDES THE UPPER.


 0224   REF   4 LAST 852    30,3577  3 1570 1  WHERETO  CA      FC
 0225   REF   2 LAST 852    30,3600  6 3536 1           AD      -LOCRIT
 0226                       30,3601  0 0006 1           EXTEND
 0227   REF   1             30,3602  6 3620 0           BZMF    DOPIP          BRANCH IF FC < LOCRIT
 0228   REF   5 LAST 854    30,3603  4 1570 0           CS      FC
 0229   REF   2 LAST 853    30,3604  6 3704 1           AD      +HICRIT
 0230                       30,3605  0 0006 1           EXTEND
 0231   REF   1             30,3606  6 3613 0           BZMF    FLATOUT        BRANCH IF FC > OR = HICRIT
 0232   REF   3 LAST 854    30,3607  4 3704 0           CS      +HICRIT
 0233   REF   3 LAST 853    30,3610  6 1567 1           AD      FCOLD
 0234                       30,3611  0 0006 1           EXTEND
 0235   REF   2 LAST 854    30,3612  6 3620 0           BZMF    DOPIP          BRANCH IF FCOLD < OR = HICRIT,
A0236                                                                          OTHERWISE PROCEED TO FLATOUT
```

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```
P0237
A0238                                                          **************
A0239                                                          * EXECUTION *
A0240                                                          **************

 0241                          30,3613  0 0006 1  FLATOUT  EXTEND
 0242  REF   1                30,3614  3 3703 0           DCA     +PHIGH
 0243  REF   6 LAST 854       30,3615  53'571 1           DXCH    FC
 0244  REF   1                30,3616  4 3536 0           CS      FEXTRA
 0245  REF   4 LAST 853       30,3617  55'574 1           TS      PIFPSET

 0246  REF 123 LAST 852       30,3620  0 4161 0  DOPIF    TC      PHASCHNG
 0247                          30,3621    04024 0          OCT     04024          ?

 0248                          30,3622  0 0006 1           EXTEND
 0249  REF   7 LAST 855       30,3623  3 1571 0           DCA     FC
 0250  REF   4 LAST 854       30,3624  55'567 0           TS      FCOLD          HISTORY
 0251  REF   1                30,3625  53'573 0           DXCH    PIF
 0252                          30,3626  0 0006 1           EXTEND
 0253  REF   4 LAST 853       30,3627  4 1566 1           DCS     FOLD
 0254  REF   2 LAST 855       30,3630  21'573 0           DAS     PIF            PIF = FC - FOLD
 02545 REF   1                30,3631  0 3713 1           TC      DAPLOGIC

 0255  REF   3 LAST 855       30,3632  3 1572 0  DAPLRETN CA      PIF
 0256  REF   5 LAST 855       30,3633  6 1574 0           AD      PIFPSET        ADD IN PIFPSET, NOT CHANGING PIF

 0257  REF   5 LAST 405       30,3634  54 055 0  DOIT     TS      THRUST
 0258  REF 124 LAST 855       30,3635  0 4161 0           TC      PHASCHNG
 0259                          30,3636   04024 0          OCT     04024

 0260  REF  44 LAST 825       30,3637  3 7760 1           CAF     BIT4
 0261                          30,3640  0 0006 1           EXTEND
 0262                          30,3641  05 014 1           WOR     14             AND THE ENGINE DOES THE REST...

A0263                                                          SINCE /AF/ IS NOT AN INSTANTANEOUS
A0264                                                          ACCELERATION (WOULD THAT IT WERE!) BUT
A0265                                                          RATHER AN "AVERAGE" OF THE ACCELERATION
A0266                                                          LEVELS OF THE LAST PIPA INTERVAL, AND
A0267                                                          SINCE FOLD IS COMPUTED DIRECTLY FROM
A0268                                                          /AF/, FOLD IN ORDER TO CORRESPOND TO THE
A0269                                                          ACTUAL THRUST LEVEL AT THE END OF THE
A0270                                                          INTERVAL MUST BE WEIGHTED BY

A0271                                                                    PIF PPROCES     PIF /PIF/
A0272                                                          FWEIGHT = ----------- + ------------ ,
A0273                                                                      PGUID       2 PGUID FRATE

A0274                                                          WHERE PPROCES IS THE TIME BETWEEN PIPA
A0275                                                          READING AND THE START OF THROTTLING,
A0276                                                          PGUID IS THE GUIDANCE PERIOD (2 SECONDS)
```

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```
A0277                                                   AND FRATE IS THE THROTTLING RATE (SOME
A0278                                                   3200 UNITS PER SECOND).  HERE FWEIGHT
A0279                                                   IS COMPUTED FOR USE NEXT PASS.

0280                            30,3642  0 0006 1       EXTEND
0281  REF  36 LAST 835          30,3643  3 0025 0       DCA     TIME2
0282  REF 301 LAST 852          30,3644  52 145 0       DXCH    MPAC
0283                            30,3645  0 0006 1       EXTEND
0284  REF   9 LAST 835          30,3646  4 1307 0       DCS     PIPTIME
0285  REF 302 LAST 856          30,3647  20 145 0       DAS     MPAC
0286  REF   1                   30,3650  3 3465 0       CA      PGUID
0287  REF 303 LAST 856          30,3651  56 145 1       XCH     MPAC +1
0288  REF  46 LAST 819          30,3652  7 7743 1       MASK    POSMAX          IN CASE THAT LOUSY SIGN BIT IS SET
0289                            30,3653  0 0006 1       EXTEND
0290  REF 304 LAST 856          30,3654  10 145 0       DV      MPAC +1         WHICH CONTAINS PGUID
0291                            30,3655  0 0006 1       EXTEND
0292  REF   4 LAST 855          30,3656  7 1572 1       MP      PIF
0293  REF   6 LAST 853          30,3657  53'577 1       DXCH    FWEIGHT         FWEIGHT = (PPROCES/PGUID)PIF, SO FAR...

0294  REF   1                   30,3660  3 3535 1       CA      2.PG.FRT
0295  REF 305 LAST 856          30,3661  56 144 0       XCH     MPAC            TO BE USED AS A DIVISOR LATER
0296  REF   5 LAST 856          30,3662  11'572 1       CCS     PIF
0297  REF 157 LAST 820          30,3663  6 7763 1       AD      ONE
0298                            30,3664  1 3666 0       TCF     +2
0299  REF 158 LAST 856          30,3665  6 7763 1       AD      ONE
0300                            30,3666  0 0006 1       EXTEND                  AT THIS POINT HAVE /PIF/ IN A
0301  REF   6 LAST 856          30,3667  7 1572 1       MP      PIF
0302                            30,3670  0 0006 1       EXTEND
0303  REF 306 LAST 856          30,3671  10 144 1       DV      MPAC            WHICH CONTAINS 2.PG.FRT
0304                            30,3672  22 007 0       LXCH    7
0305  REF   7 LAST 856          30,3673  21'577 1       DAS     FWEIGHT

0306  REF 125 LAST 855          30,3674  0 4161 0       TC      PHASCHNG
0307                            30,3675   00004 0       OCT     00004
0308  REF  93 LAST 827          30,3676  1 5567 1       TCF     ENDOFJOB
```

L THROTTLE CONTROL USER'S OWN PAGE NO. 9 S3 E5

```
P0309
A0310                                                                   **********
A0311                                                                   * CONSTANTS *
A0312                                                                   **********
A0313                                                                   CONSTANTS FOR DECISION
 0314                    30,3677  07432 0  +FODD    DEC     +3866  B-14   THIS MUCH SATURATES THROTTLE
 0315                    30,3700  70325 1  -FMAX    2DEC    -3882  B-14   NOMINAL MAX THRUST IN BIT UNITS
C0315                    30,3701  77777 0
 0316                    30,3702  07100 1  +FHIGH   2DEC    +3648  B-14   MAX ATTAINABLE THRUST, UNERODED
C0316                    30,3703  00000 1
 0317                    30,3704  04314 0  +HICRIT  DEC     +2252  B-14   THE HIGHER MID-SCALE CRITERION

R0325  ----------------------------------------------------------------------
R0326  SINCE BETWEEN REVISION 113 AND 114 IT WAS NECESSARY TO PRESERVE THE
R0327  LOCATIONS IN MEMORY OF LABELS ADDRESSED FROM OTHER BANKS (SINCE THE ROPE
R0328  IS ALREADY UNDER CONSTRUCTION) CERTAIN CONSTANTS WERE REMOVED FROM THIS
R0329  SECTION FOR USE AS FILLER ELSEWHERE.  THESE ARE -LOCRIT, +FLOW,
R0330  SCALEFAC, FEXTRA, THROTDT, PGUID, AND 2.PG.FRI.
R0331  ----------------------------------------------------------------------


A0500                                                                   IF THE TRIM GIMBAL IS TURNED OFF BY
A0500S                                                                  THE THROTTLE, THIS TASK WILL REENABLE IT
A0501                                                                   ABOUT 2 SECONDS LATER.
 0502  REF  11 LAST 817  30,3705  0 6076 0  THROTOVR TC      FLAG2DWN
 0503                    30,3706  00010 0            UCI     00010
 0504  REF 247 LAST 853  30,3707  4 7767 1            CS      ZERO
 0505                    30,3710  22 007 0           ZL
 0506  REF   7 LAST 850  30,3711  53'100 0           DXCH    -PHASE1
 0507  REF 115 LAST 850  30,3712  1 5727 1           TCF     TASKOVER


 0507S REF   7 LAST 856  30,3713  3 1572 0  DAPLOGIC CA      PIF
 0508                    30,3714  0 0006 1           EXTEND
 0509                    30,3715  6 3717 0           BZMF    +2
 0510                    30,3716  4 0000 0           COM

 0512  REF   1           30,3717  6 3770 1           AD      HITHRESH
 0513                    30,3720  0 0006 1           EXTEND
 0514  REF   1           30,3721  6 3750 0           BZMF    JETSET          BRANCH IF /PIF/ > OR = HITHRESH

 0515  REF   5 LAST 855  30,3722  3 1565 0           CA      FOLD
 0516                    30,3723  6 0000 1           DOUBLE
 0517  REF  25 LAST 850  30,3724  54 120 0           TS      BUF
```

L THROTTLE CONTROL USER'S OWN PAGE NO. 10 S3 E5

```
0518   REF   8 LAST 855     30,3725  3 1570 1          CA      FC
0519                        30,3726  0 0006 1          EXTEND
0520   REF  26 LAST 857     30,3727  10 120 0          DV      BUF             WHERE TWICE FOLD WAS STORED
0521   REF  27 LAST 858     30,3730  54 120 0          TS      BUF
05211  REF   7 LAST 586     30,3731  3 5632 0          CA      EBANK6
05212  REF  57 LAST 845     30,3732  54 003 0          TS      EBANK
05213  REF   7 LAST 592                   E6          EBANK=  D2CDUYFL
05214  REF  28 LAST 858     30,3733  3 0120 1          CA      BUF
0522                        30,3734  0 0006 1          EXTEND
0523   REF   8 LAST 858     30,3735  7 1563 1          MP      D2CDUYFL
0524                        30,3736  6 0000 1          DOUBLE
0525   REF   9 LAST 858     30,3737  57*563 0          XCH     D2CDUYFL
0526   REF  29 LAST 858     30,3740  3 0120 1          CA      BUF
0527                        30,3741  0 0006 1          EXTEND
0528   REF   5 LAST 592     30,3742  7 1565 1          MP      D2CDUZFL
0529                        30,3743  6 0000 1          DOUBLE
0530   REF   6 LAST 858     30,3744  57*565 0          XCH     D2CDUZFL

05301  REF   7 LAST 690     30,3745  3 5661 0          CA      EBANK5
05302  REF  58 LAST 858     30,3746  54 003 0          TS      EBANK
05303  REF  22 LAST 852                   E5          EBANK=  ETHROT
0531   REF   1              30,3747  1 3632 1          TCF     DAPLRETN



0532                        30,3750  0 0004 0  JETSET  INHINT
0533   REF  64 LAST 825     30,3751  4 0077 0          CS      DAPBOOLS        INHIBIT USE OF TRIM GIMBAL
0534   REF   9 LAST 825     30,3752  7 7762 1          MASK    USEGRJTS
0535   REF  65 LAST 858     30,3753  26 077 0          ADS     DAPBOOLS

0536   REF   2 LAST 852     30,3754  3 3464 1          CA      THROTDT         SET UP TASK TO REMOVE THE INHIBITION
0537   REF 122 LAST 852     30,3755  0 5663 1          TC      WAITLIST          CREATED BELOW
0538   REF  23 LAST 858                   E5          EBANK=  ETHROT
0539                        30,3756   03705 0          2CADR   THROTOVR
05399  REF   1              30,3757   60065 1
0542   REF   9 LAST 826     30,3760  0 6060 1          TC      FLAG2UP         INHIBIT THE GIMBLMON FROM REACTIVATING
0543                        30,3761   00010 0          OCT     00010             THE GIMBAL

05431  REF 126 LAST 856     30,3762  0 4161 0          TC      PHASCHNG
05432                       30,3763   47011 1          OCT     47011
05433                       30,3764   00303 1          DEC     195
05434  REF  24 LAST 858                   E5          EBANK=  ETHROT
05435                       30,3765   03705 0          2CADR   THROTOVR
05435  REF   2 LAST 858     30,3766   60065 1
0544   REF   2 LAST 858     30,3767  1 3632 1          TCF     DAPLRETN



0545                        30,3770   00302 0  HITHRESH DEC     +194            ABOUT 5 % OF NOMINAL MAXIMUM THRUST
```

L IMU COMPENSATION PACKAGE USER'S OWN PAGE NO. 1 53

```
 0001                                12,3222          BANK   12
 0002   REF   3 LAST BIT              E3               EBANK= NBDX

R0003   PROGRAM DESCRIPTION- IMU COMPENSATION (LEM)                    DATE- 1 DEC 66
R0005   MOD NO- 0                                                     LOG SECTION- IMU COMPENSATION PACKAGE
R0007   MOD BY- GILBERT                                               ASSEMBLY- SUNBURST REVISION 48

R0009   FUNCTIONAL DESCRIPTION
R0010           THE IMU COMPENSATION PACKAGE IS DESIGNED TO COMPENSATE FOR PIPA BIAS AND SCALE FACTOR ERROR AND AT THE
R0012   SAME TIME ACCUMULATE GYRO TORQUING COMMANDS NECESSARY TO COMPENSATE FOR THE ASSOCIATED BIAS AND ACCELERATION-
R0014   CAUSED GYRO DRIFTS. 1/PIPA MUST BE CALLED AT LEAST EVERY 2.56 SECONDS DUE TO SCALING CONSIDERATIONS.
R0016   SPECIFICALLY, THE CORRECTION IS

R0017           PIPA  = (1 + SCALE FACTOR ERROR)PIPA  - (BIAS)(DELTAT)
R0018              C                             I

R0019   WHERE PIPA  IS THE COMPENSATED DATA OBTAINED FROM THE SAMPLED DATA PIPA
R0020             C                                                  I

R0021   THE COMPENSATED DATA IS THEN USED TO COMPUTE THE IRIG TORQUING NECESSARY TO CANCEL THE NBD, ADIA, AND ADSRA
R0023   GYRO COEFFICIENTS.
R0024   SPECIFICALLY, THE COMPUTATIONS ARE

R0025           XIRIG     -(ADIAX)(PIPAX ) + (ADSRAX)(PIPAY ) - (NBDX)(DELTAT)
R0026                              C                  C
R0027           YIRIG     -(ADIAY)(PIPAY ) + (ADSRAY)(PIPAZ ) - (NBDY)(DELTAT)
R0028                              C                  C
R0029           ZIRIG     -(ADIAZ)(PIPAZ ) - (ADSRAZ)(PIPAY ) + (NBDZ)(DELTAT)
R0030                              C                  C

R0031   THIS COMPENSATION IS SUMMED INTO THE GCOMP REGISTERS AND WHEN THE MAGNITUDE OF ANY IRIG COMMAND EXCEEDS 2
R0033   PULSES, THE COMMANDS ARE SENT TO THE GYROS.

R0034   DURING FREE-FALL PHASES OF A FLIGHT NBDX, NBDY, AND NBDZ ARE THE ONLY RELEVANT COEFFICIENTS. THESE BIAS TERMS
R0036   WILL BE INTEGRATED BY ROUTINE NBDONLY APPROXIMATELY EVERY 81.93 SECONDS FOLLOWING AN EXECUTIVE CALL BY THE DUMMY
R0038   TASK OF THE WAITLIST PROGRAM. NBDONLY IS ENABLED WHEN BIT 15 OF FLAGWRD2 IS SET TO INDICATE FREE-FALL. DURING
R0040   THIS TIME 1/PIPA IS NOT CALLED.

R0041   LASTBIAS IS CALLED VIA EXECUTIVE WHEN MAKING THE TRANSITION FROM FREE-FALL TO A PIPA READING MODE. THE NBD TERMS
R0043   ARE COMPENSATED FOR FROM THE LAST NBDONLY CALL UP TO PIPA ZEROING. PREREAD WILL THEN ENABLE 1/PIPA AT ITS
R0045   REGULAR INTERVAL. THE DRIFT FLAG MUST BE DOWN JUST PRIOR TO LASTBIAS. GYROCOMPASS NEVER CALLS LASTBIAS.

R0047   SCALING CONSIDERATIONS
R0048                               UNITS              MAX. VALUE     INTERNAL UNITS AND SCALING

R0050           PIPA BIAS           (CM)/(SEC)(SEC)    3.125          (PIPA PULSES)/(CS) X 2(-5)
R0052           PIPA SCALE FACTOR   P.P.M.             1953.125       (PPM) X 2(-9)
R0054           NBD                 MERU               128.74604      (GYRO PULSES)/(CS) X 2(-5)
R0056           ADIA                (MERU)/(G)         630.36633      (GYRO PULSES)/(PIPA PULSE) X 2(-6)
R0058           ADSRA               (MERU)/(G)         630.36633      (GYRO PULSES)/(PIPA PULSE) X 2(-6)
```

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R0060   CONVERSION TABLE
R0061         1 PIPA PULSE = 1.00 (CM)/(SEC)              1 ERU = 7.29209817 X 10(-5) (RAD)/(SEC)
R0063         1 ERU = 15.04104488 (ARCSEC)/(SEC)          1 (CM)/(SEC)(SEC) = .01 (PIPA PULSES)/(CS)
R0065         1 GYRO PULSE = .61798096 ARCSEC             1 MERU = .00024272592 (GYRO PULSES)/(CS)
R0067         1 G = 979.24 (CM)/(SEC)(SEC)  (AMR)         1 (MERU)/(G) = .00002478174 (GYRO PULSES)/(PIPA PULSE)

R0069   REFERENCES
R0070         AGC PROGRAMMING MEMO NO. 12, I.S.S. MEMO NO. 247, I.S.S. MEMO NO. 328, I.S.S. MEMO NO. 339

R0072   CALLING SEQUENCE
R0073         L      TC     BANKCALL
R0074         L+1    CADR   1/PIPA
R0075         L+2                          RETURNS HERE

R0076   NORMAL EXIT MODES
R0077         AT L+2 OF CALLING SEQUENCE

R0078   ALARM OR ABORT MODES
R0079         ENDOFJOB

R0080   ERASABLE INITIALIZATION REQUIRED (CONSECUTIVE LOCATIONS)
R0081         PBIASX     PIPAX BIAS
R0082         PIPASCFX   PIPAX SCALE FACTOR ERROR
R0083         PBIASY     PIPAY BIAS
R0084         PIPASCFY   PIPAY SCALE FACTOR ERROR
R0085         PBIASZ     PIPAZ BIAS
R0086         PIPASCFZ   PIPAZ SCALE FACTOR ERROR
R0087         NBDX       X IRIG BIAS DRIFT
R0088         NBDY       Y IRIG BIAS DRIFT
R0089         NBDZ       Z IRIG BIAS DRIFT
R0090         ADIAX      IRIG ACCELERATION SENSITIVE DRIFT ALONG THE X INPUT AXIS
R0091         ADIAY      IRIG ACCELERATION SENSITIVE DRIFT ALONG THE Y INPUT AXIS
R0092         ADIAZ      IRIG ACCELERATION SENSITIVE DRIFT ALONG THE Z INPUT AXIS
R0093         ADSRAX     IRIG ACCELERATION SENSITIVE DRIFT ALONG THE X SPIN REFERENCE AXIS
R0095         ADSRAY     IRIG ACCELERATION SENSITIVE DRIFT ALONG THE Y SPIN REFERENCE AXIS
R0097         ADSRAZ     IRIG ACCELERATION SENSITIVE DRIFT ALONG THE Z SPIN REFERENCE AXIS
R0099         GCOMP      GYRO COMPENSATION PULSES (SET = ZERO FOR 1ST PASS)

R0100   INPUT
R0101         1/PIPADT = DELTA TIME SCALED AT (CS) X 2(+8)
R0102         DELVX, DELVY, DELVZ = PIPA READINGS IN THE MAJOR PARTS - MINOR PARTS IRRELEVANT

R0104   OUTPUT
R0105         DELVX, DELVY, DELVZ = PIPA COUNTS SCALED 2(+14) COMPENSATED FOR PIPA BIAS AND SCALE FACTOR ERROR
R0107         GCOMP = 3 DP LOCATIONS CONTAINING GYRO PULSES TO COMPENSATE FOR NBD, ADIA, AND ADSRA COEFFICIENTS

R0109   DEBRIS
R0110         CENTRALS = A,L,Q
R0111         OTHER = BUF - BUF +2, VBUF - VBUF +2, GCOMPSW
```

L IMU COMPENSATION PACKAGE USER'S OWN PAGE NO. 3 53 E3

```
0112  REF   1                12,3222  3 3455 0  1/PIPA   CAF   LGCOMP    SAVE EBANK OF CALLING PROGRAM
0113  REF  59 LAST. 858      12,3223  56 003 1           XCH   EBANK
0114  REF   4 LAST 847       12,3224  54 153 1           TS    MODE

0115  REF   1                12,3225  11'463 0           CCS   GCOMPSW   BYPASS IF GCOMPSW NEGATIVE
0116                         12,3226  1 3231 0           TCF   +3
0117                         12,3227  1 3231 0           TCF   +2
0118  REF   1                12,3230  1 3346 1           TCF   IRIGI     RETURN

0119  REF  26 LAST 845       12,3231  3 7761 0  1/PIPA1  CAF   FOUR      PIPAZ, PIPAY, PIPAX
0120  REF  30 LAST 858       12,3232  54 122 1           TS    BUF +2

0121  REF  31 LAST 861       12,3233  50 122 0           INDEX BUF +2
0122  REF   1                12,3234  3 1437 0           CA    PIPASCF   (P.P.M.) X 2(-9)
0123                         12,3235  0 0006 1           EXTEND
0124  REF  32 LAST 861       12,3236  5 0122 0           INDEX BUF +2
0125  REF  15 LAST 837       12,3237  7 0403 1           MP    DELVX     (PP) X 2(+14) NOW (PIPA PULSES) X 2(+5)
0126  REF 239 LAST 846       12,3240  54 002 1           TS    Q         SAVE MAJOR PART

0127  REF 154 LAST 809       12,3241  3 0001 0           CA    L         MINOR PART
0128                         12,3242  0 0006 1           EXTEND
0129  REF  43 LAST 826       12,3243  7 7756 0           MP    BIT6      SCALE 2(+9)   SHIFT RIGHT 9
0130  REF  33 LAST 861       12,3244  50 122 0           INDEX BUF +2
0131  REF  16 LAST 861       12,3245  54 404 0           TS    DELVX +1  FRACTIONAL PIPA PULSES SCALED 2(+14)

0132  REF 240 LAST 861       12,3246  3 0002 0           CA    Q         MAJOR PART
0133                         12,3247  0 0006 1           EXTEND
0134  REF  44 LAST 861       12,3250  7 7756 0           MP    BIT6      SCALE 2(+9)   SHIFT RIGHT 9
0135  REF  34 LAST 861       12,3251  50 122 0           INDEX BUF +2
0136  REF  17 LAST 861       12,3252  20 404 0           DAS   DELVX     (PIPAI) + (PIPAI)(SFE)

0137  REF  35 LAST 861       12,3253  50 122 0           INDEX BUF +2
0138  REF   1                12,3254  4 1436 0           CS    PIPABIAS  (PIPA PULSES)/(CS) X 2(-5)                *
0139                         12,3255  0 0006 1           EXTEND
0140  REF   4 LAST 675       12,3256  7 0765 1           MP    1/PIPADT  (CS) X 2(+8)  NOW (PIPA PULSES) X 2(+3)*
0141                         12,3257  0 0006 1           EXTEND
0142  REF  45 LAST 855       12,3260  7 7760 0           MP    BIT4      SCALE 2(+11)  SHIFT RIGHT 11               *
0143  REF  36 LAST 861       12,3261  50 122 0           INDEX BUF +2
0144  REF  18 LAST 861       12,3262  20 404 0           DAS   DELVX     (PIPAI) + (PIPAI)(SFE) - (BIAS)(DELTAT)

0145  REF  37 LAST 861       12,3263  10 122 1           CCS   BUF +2    PIPAZ, PIPAY, PIPAX
0146  REF   4 LAST 536       12,3264  6 7771 1           AD    NEG1
0147  REF   1                12,3265  1 3232 0           TCF   1/PIPA1 +1
0148                         12,3266  1 3267 0           NOOP            LESS THAN ZERO IMPOSSIBLE
```

L IMU COMPENSATION PACKAGE USER'S OWN PAGE NO. 4 S3 E3

```
0149  REF   2 LAST 861     12,3267  55'463 0  IRIGCOMP TS      GCOMPSW     INDICATE COMMANDS 2 PULSES OR LESS
0150  REF  38 LAST 861     12,3270  54 120 0            TS      BUF         INDEX COUNTER = IRIGX, IRIGY, IRIGZ

0151                       12,3271  0 0006 1  IRIGX     EXTEND
0152  REF  19 LAST 861     12,3272  4 0404 0            DCS     DELVX       (PIPA PULSES) X 2(+14)
0153  REF 307 LAST 856     12,3273  52 145 0            DXCH    MPAC
0154  REF   2 LAST 296     12,3274  3 1447 1            CA      ADIAX       (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
0155  REF   1               12,3275  0 3351 0            TC      GCOMPSUB    -(ADIAX)(PIPAX)   (GYRO PULSES) X 2(+14)

0156                       12,3276  0 0006 1            EXTEND
0157  REF   8 LAST 837     12,3277  4 0406 1            DCS     DELVY       (PIPA PULSES) X 2(+14)
0158  REF 308 LAST 862     12,3300  52 145 0            DXCH    MPAC
0159  REF   2 LAST 296     12,3301  4 1452 1            CS      ADSKAX      (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
0160  REF   2 LAST 862     12,3302  0 3351 0            TC      GCOMPSUB    +(ADSKAX)(PIPAY)  (GYRO PULSES) X 2(+14)

0161  REF   4 LAST 859     12,3303  4 1444 0            CS      NBDX        (GYRO PULSES)/(CS) X 2(-5)
0162  REF   1               12,3304  0 3400 0            TC      DRIFTSUB    -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

0163                       12,3305  0 0006 1  IRIGY     EXTEND
0164  REF   9 LAST 862     12,3306  4 0406 1            DCS     DELVY       (PIPA PULSES) X 2(+14)
0165  REF 309 LAST 862     12,3307  52 145 0            DXCH    MPAC
0166  REF   1               12,3310  3 1450 1            CA      ADIAY       (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
0167  REF   3 LAST 862     12,3311  0 3351 0            TC      GCOMPSUB    -(ADIAY)(PIPAY)   (GYRO PULSES) X 2(+14)

0168                       12,3312  0 0006 1            EXTEND
0169  REF   8 LAST 837     12,3313  4 0410 0            DCS     DELVZ       (PIPA PULSES) X 2(+14)
0170  REF 310 LAST 862     12,3314  52 145 0            DXCH    MPAC
0171  REF   1               12,3315  4 1453 0            CS      ADSKAY      (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
0172  REF   4 LAST 862     12,3316  0 3351 0            TC      GCOMPSUB    +(ADSKAY)(PIPAZ)  (GYRO PULSES) X 2(+14)

0173  REF   1               12,3317  4 1445 1            CS      NBDY        (GYRO PULSES)/(CS) X 2(-5)
0174  REF   2 LAST 862     12,3320  0 3400 0            TC      DRIFTSUB    -(NBDY)(DELTAT)   (GYRO PULSES) X 2(+14)

0175                       12,3321  0 0006 1  IRIGZ     EXTEND
0176  REF  10 LAST 862     12,3322  4 0406 1            DCS     DELVY       (PIPA PULSES) X 2(+14)
0177  REF 311 LAST 862     12,3323  52 145 0            DXCH    MPAC
0178  REF   1               12,3324  3 1454 0            CA      ADSKAZ      (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
0179  REF   5 LAST 862     12,3325  0 3351 0            TC      GCOMPSUB    -(ADSKAZ)(PIPAY)  (GYRO PULSES) X 2(+14)

0180                       12,3326  0 0006 1            EXTEND
0181  REF   9 LAST 862     12,3327  4 0410 0            DCS     DELVZ       (PIPA PULSES) X 2(+14)
0182  REF 312 LAST 862     12,3330  52 145 0            DXCH    MPAC
0183  REF   1               12,3331  3 1451 0            CA      ADIAZ       (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
0184  REF   6 LAST 862     12,3332  0 3351 0            TC      GCOMPSUB    -(ADIAZ)(PIPAZ)   (GYRO PULSES) X 2(+14)

0185  REF   1               12,3333  3 1446 0            CA      NBDZ        (GYRO PULSES)/(CS) X 2(-5)
0186  REF   3 LAST 862     12,3334  0 3400 0            TC      DRIFTSUB    +(NBDZ)(DELTAT)   (GYRO PULSES) X 2(+14)
```

L IMU COMPENSATION PACKAGE USER'S OWN PAGE NO. 5 S3 E3

```
0187  REF   3 LAST 862     12,3335  11'463 0            CCS    GCOMPSW      ARE GYRO COMMANDS GREATER THAN 2 PULSES
0188                       12,3336  1 3340 1            TCF    +2           YES
0189  REF   2 LAST 861     12,3337  1 3346 1            TCF    IRIG1        NO

0190                       12,3340  0 0004 0            INHINT
0191  REF   3 LAST 722     12,3341  3 5656 1            CAF    PRIO35       SEND OUT GYRO TORQUING COMMANDS
0192  REF  33 LAST 851     12,3342  0 5505 1            TC     NOVAC
0193  REF   5 LAST 862                E3                EBANK= NBDX
0194                       12,3343   03433 0            2CADR  1/GYRO
C0194 REF   1              12,3344   24063 1
0195                       12,3345  0 0003 1            RELINT
0196  REF   5 LAST 861     12,3346  3 0153 0  IRIG1     CA     MODE         SET EBANK FOR RETURN
0197  REF  60 LAST 861     12,3347  54 003 0            TS     EBANK
0198  REF   7 LAST 524     12,3350  1 5221 1            TCF    SWRETURN



0199  REF 313 LAST 862     12,3351  56 144 0  GCOMPSUB XCH    MPAC         ADIA OR ADSKA COEFFICIENT ARRIVES IN A
0200                       12,3352  0 0006 1            EXTEND               C(MPAC) = (PIPA PULSES) X 2(+14)
0201  REF 314 LAST 863     12,3353  7 0144 1            MP     MPAC         (GYRO PULSES)/(PIPA PULSE) X 2(-6)      *
0202  REF  16 LAST  19     12,3354  52 113 0            DXCH   VBUF         NOW = (GYRO PULSES) X 2(+8)             *

0203  REF 315 LAST 863     12,3355  3 0145 1            CA     MPAC +1      MINOR PART PIPA PULSES
0204                       12,3356  0 0006 1            EXTEND
0205  REF 316 LAST 863     12,3357  7 0144 1            MP     MPAC         ADIA OR ADSKA
0206  REF 155 LAST 861     12,3360  54 001 1            TS     L
0207  REF 248 LAST 857     12,3361  3 7767 0            CAF    ZERO
0208  REF  17 LAST 863     12,3362  20 113 0            DAS    VBUF         NOW = (GYRO PULSES) X 2(+8)             *

0209  REF  18 LAST 863     12,3363  3 0112 0            CA     VBUF         PARTIAL RESULT = MAJOR
0210                       12,3364  0 0006 1            EXTEND
0211  REF  18 LAST 728     12,3365  7 7753 0            MP     BIT9         SCALE 2(+6)      SHIFT RIGHT 6          *
0212  REF  39 LAST 862     12,3366  50 120 1            INDEX  BUF          RESULT = (GYRO PULSES) X 2(+14)
0213  REF   9 LAST 143     12,3367  21'456 0            DAS    GCOMP        MI(ADIA)(PIPAI)  OR  MI(ADSKA)(PIPAI)

0214  REF  19 LAST 863     12,3370  3 0113 1            CA     VBUF +1      PARTIAL RESULT = MINOR
0215                       12,3371  0 0006 1            EXTEND
0216  REF  19 LAST 863     12,3372  7 7753 0            MP     BIT9         SCALE 2(+6)      SHIFT RIGHT 6          *
0217  REF 156 LAST 863     12,3373  54 001 1            TS     L
0218  REF 249 LAST 863     12,3374  3 7767 0            CAF    ZERO
0219  REF  40 LAST 863     12,3375  50 120 1            INDEX  BUF          RESULT = (GYRO PULSES) X 2(+14)
0220  REF  10 LAST 863     12,3376  21'456 0            DAS    GCOMP        (ADIA)(PIPAI)  OR  (ADSKA)(PIPAI)

0221  REF 241 LAST 861     12,3377  0 0002 0            TC     Q
```

L IMU COMPENSATION PACKAGE USER'S OWN PAGE NO. 6 S3 E3

```
0222                          12,3400  0 0006 1  DRIFTSUB EXTEND
0223   REF  41 LAST 863       12,3401  22 121 0          DXCH   BUF +1

0224                          12,3402  0 0006 1          EXTEND                 C(A) = NBD    (GYRO PULSES)/(CS) X 2(-5)
0225   REF   5 LAST 861       12,3403  7 0765 1          MP     17/PIPADT       (CS) X 2(+8)   NOW (GYRO PULSES) X 2(+3)
0226   REF 317 LAST 863       12,3404  22 145 1          DXCH   MPAC +1         SAVE FOR FRACTIONAL COMPENSATION
0227                          12,3405  0 0006 1          EXTEND
0228   REF  46 LAST 861       12,3406  7 7760 0          MP     BIT4            SCALE 2(+11)      SHIFT RIGHT 11
0229   REF  42 LAST 864       12,3407  50 120 1          INDEX  BUF
0230   REF  11 LAST 863       12,3410  21'456 0          DAS    GCOMP           HI(NBD)(DELTAT)    (GYRO PULSES) X 2(+14)

0231   REF 318 LAST 864       12,3411  3 0145 1          CA     MPAC +1         NOW MINOR PART
0232                          12,3412  0 0006 1          EXTEND
0233   REF  47 LAST 864       12,3413  7 7760 0          MP     BIT4            SCALE 2(+11)      SHIFT RIGHT 11
0234   REF 157 LAST 863       12,3414  54 001 1          TS     L
0235   REF 250 LAST 863       12,3415  3 7767 0          CAF    ZERO
0236   REF  43 LAST 864       12,3416  50 120 1          INDEX  BUF             ADD IN FRACTIONAL COMPENSATION
0237   REF  12 LAST 864       12,3417  21'456 0          DAS    GCOMP           (NBD)(DELTAT)      (GYRO PULSES) X 2(+14)

0238   REF  94 LAST 821       12,3420  3 7762 0  DRFTSUB2 CAF    TWO             PIPAX, PIPAY, PIPAZ
0239   REF  44 LAST 864       12,3421  6 0120 1          AD     BUF
0240   REF  45 LAST 864       12,3422  56 120 1          XCH    BUF
0241   REF 309 LAST 833       12,3423  50 000 1          INDEX  A
0242   REF  13 LAST 864       12,3424  11'455 0          CCS    GCOMP           ARE GYRO COMMANDS 1 PULSE OR GREATER
0243                          12,3425  1 3427 1          TCF    +2              YES
0244   REF  46 LAST 864       12,3426  0 0121 0          TC     BUF +1          NO

0245   REF   1                12,3427  7 3477 1          MASK   COMPCHK         DEC -1
0246   REF 310 LAST 864       12,3430  10 000 0          CCS    A               ARE GYRO COMMANDS GREATER THAN 2 PULSES
0247   REF   4 LAST 863       12,3431  55'463 0          TS     GCOMPSW         YES - SET GCOMPSW POSITIVE
0248   REF  47 LAST 864       12,3432  0 0121 0          TC     BUF +1          NO
```

L IMU COMPENSATION PACKAGE USER'S OWN PAGE NO. 7 S3 E3

```
0249  REF  27 LAST 861   12,3433  3 7761 0  1/GYRO   CAF    FOUR      PIPAZ, PIPAY, PIPAX
0250  REF  48 LAST 864   12,3434  54 120 0           TS     BUF
0251  REF  49 LAST 865   12,3435  50 120 1           INDEX  BUF       SCALE GYRO COMMANDS FOR IMUPULSE
0252  REF  14 LAST 864   12,3436  3 1456 1           CA     GCOMP +1  FRACTIONAL PULSES
0253                     12,3437  0 0006 1           EXTEND
0254  REF  26 LAST 809   12,3440  7 7754 1           MP     BIT8      SHIFT RIGHT 7
0255  REF  50 LAST 865   12,3441  50 120 1           INDEX  BUF
0256  REF  15 LAST 865   12,3442  55'456 0           TS     GCOMP +1  FRACTIONAL PULSES SCALED
0257  REF 251 LAST 864   12,3443  3 7767 0           CAF    ZERO      SET GCOMP = 0 FOR DAS INSTRUCTION
0258  REF  51 LAST 865   12,3444  50 120 1           INDEX  BUF
0259  REF  16 LAST 865   12,3445  57'455 1           XCH    GCOMP     GYRO PULSES
0260                     12,3446  0 0006 1           EXTEND
0261  REF  27 LAST 865   12,3447  7 7754 1           MP     BIT8      SHIFT RIGHT 7
0262  REF  52 LAST 865   12,3450  50 120 1           INDEX  BUF
0263  REF  17 LAST 865   12,3451  21'456 0           DAS    GCOMP     ADD THESE TO FRACTIONAL PULSES ABOVE
0264  REF  53 LAST 865   12,3452  10 120 0           CCS    BUF       PIPAZ, PIPAY, PIPAX
0265  REF   5 LAST 861   12,3453  6 7771 1           AD     NEG1
0266  REF   2 LAST 863   12,3454  1 3434 0           TCF    1/GYRO +1
0267  REF  18 LAST 865   12,3455  01455 1  LGCOMP    ECADR  GCOMP     LESS THAN ZERO IMPOSSIBLE
0268  REF   2 LAST 861   12,3456  3 3455 0           CAF    LGCOMP
0269  REF 131 LAST 821   12,3457  0 5206 0           TC     BANKCALL
0270  REF   5 LAST 462   12,3460  26362 1            CADR   IMUPULSE  CALL GYRO TORQUING ROUTINE
0271  REF 132 LAST 865   12,3461  0 5206 0           TC     BANKCALL
0272  REF  30 LAST 462   12,3462  26751 0            CADR   IMUSTALL  WAIT FOR PULSES TO GET OUT
0273  REF  94 LAST 856   12,3463  1 5567 1           TCF    ENDOFJOB  TEMPORARY
0274  REF  28 LAST 865   12,3464  3 7761 0  GCOMP1   CAF    FOUR      PIPAZ, PIPAY, PIPAX
0275  REF  54 LAST 865   12,3465  54 120 0           TS     BUF
0276  REF  55 LAST 865   12,3466  50 120 1           INDEX  BUF       RESCALE
0277  REF  19 LAST 865   12,3467  3 1456 1           CA     GCOMP +1
0278                     12,3470  0 0006 1           EXTEND
0279  REF  28 LAST 865   12,3471  7 7754 1           MP     BIT8      SHIFT MINOR PART LEFT 7 - MAJOR PART = 0
0280  REF  56 LAST 865   12,3472  50 120 1           INDEX  BUF
0281  REF  20 LAST 865   12,3473  23'456 1           LXCH   GCOMP +1  BITS 8-14 OF MINOR PART WERE = 0
0282  REF  57 LAST 865   12,3474  10 120 0           CCS    BUF       PIPAZ, PIPAY, PIPAX
0283  REF   6 LAST 865   12,3475  6 7771 1           AD     NEG1
0284  REF   1            12,3476  1 3465 1           TCF    GCOMP1 +1
0285                     12,3477  77776 1  COMPCHK   DEC    -1        LESS THAN ZERO IMPOSSIBLE
0286  REF  95 LAST 865   12,3500  1 5567 1           TCF    ENDOFJOB
```

L IMU COMPENSATION PACKAGE USER'S OWN PAGE NO. 8 S3 E3

```
0287   REF   5 LAST 864    12,3501  11'463 0  NBDONLY  CCS   GCOMPSW        BYPASS IF GCOMPSW NEGATIVE
0288                       12,3502  1 3505 0          TCF   +3
0289                       12,3503  1 3505 0          TCF   +2
0290   REF  96 LAST 865    12,3504  1 5567 1          TCF   ENDOFJOB

02900S                     12,3505  0 0004 0          INHINT
02901  REF  30 LAST 831    12,3506  10 076 1          CCS   FLAGWRD2      PREREAD T3RUPT MAY COINCIDE
02902  REF  97 LAST 866    12,3507  1 5567 1          TCF   ENDOFJOB
02903  REF  98 LAST 866    12,3510  1 5567 1          TCF   ENDOFJOB
02904                      12,3511  1 3512 0          TCF   +1

0291   REF  18 LAST 819    12,3512  3 0025 0          CA    TIME1          (CS) X 2(+14)
0292   REF   6 LAST 864    12,3513  56 765 0          XCH   1/PIPADT       PREVIOUS TIME
02925                      12,3514  0 0003 1          RELINT
0293                       12,3515  4 0000 0          COM
0294   REF   7 LAST 866    12,3516  6 0765 0          AD    1/PIPADT
0295   REF 311 LAST 864    12,3517  10 000 0  NBD2    CCS   A              CALCULATE ELAPSED TIME
0296   REF 159 LAST 856    12,3520  6 7763 1          AD    ONE            NO TIME1 OVERFLOW
0297   REF   1             12,3521  1 3526 1          TCF   NBD3           RESTORE TIME DIFFERENCE AND JUMP
0298                       12,3522  1 3524 0          TCF   +2             TIME1 OVERFLOW
0299   REF  99 LAST 866    12,3523  1 5567 1          TCF   ENDOFJOB       IF ELAPSED TIME = 0  (DIFFERENCE = -0)

0300                       12,3524  4 0000 0          COM                  CALCULATE ABSOLUTE DIFFERENCE
0301   REF  47 LAST 856    12,3525  6 7743 0          AD    POSMAX

0302                       12,3526  0 0006 1  NBD3    EXTEND               C(A) = DELTAT    (CS) X 2(+14)
0303   REF  44 LAST 825    12,3527  7 7752 1          MP    BIT10          SHIFT RIGHT 5
0304   REF  20 LAST 863    12,3530  52 113 0          DXCH  VBUF
0305                       12,3531  0 0006 1          EXTEND
0306   REF  21 LAST 866    12,3532  3 0113 1          DCA   VBUF
0307   REF 319 LAST 864    12,3533  52 145 0          DXCH  MPAC           DELTAT NOW SCALED (CS) X 2(+19)

0308   REF 252 LAST 865    12,3534  3 7767 0          CAF   ZERO
0309   REF   6 LAST 866    12,3535  55'463 0          TS    GCOMPSW        INDICATE COMMANDS 2 PULSES OR LESS
0310   REF  58 LAST 865    12,3536  54 120 0          TS    BUF            PIPAX, PIPAY, PIPAZ

0311   REF   6 LAST 863    12,3537  4 1444 0          CS    NBDX           (GYRO PULSES)/(CS) X 2(-5)
0312   REF   1             12,3540  0 3556 1          TC    FBIASSUB       -(NBDX)(DELTAT)   (GYRO PULSES) X 2(+14)

0313                       12,3541  0 0006 1          EXTEND
0314   REF  22 LAST 866    12,3542  4 0113 0          DCS   VBUF
0315   REF 320 LAST 866    12,3543  52 145 0          DXCH  MPAC           DELTAT SCALED (CS) X 2(+19)
0316   REF   2 LAST 862    12,3544  3 1445 0          CA    NBDY           (GYRO PULSES)/(CS) X 2(-5)
0317   REF   2 LAST 866    12,3545  0 3556 1          TC    FBIASSUB       -(NBDY)(DELTAT)   (GYRO PULSES) X 2(+14)

0318                       12,3546  0 0006 1          EXTEND
0319   REF  23 LAST 866    12,3547  4 0113 0          DCS   VBUF
0320   REF 321 LAST 866    12,3550  52 145 0          DXCH  MPAC           DELTAT SCALED (CS) X 2(+19)
0321   REF   2 LAST 862    12,3551  4 1446 1          CS    NBDZ           (GYRO PULSES)/(CS) X 2(-5)
0322   REF   3 LAST 866    12,3552  0 3556 1          TC    FBIASSUB       +(NBDZ)(DELTAT)   (GYRO PULSES) X 2(+14)
```

L IMU COMPENSATION PACKAGE USER'S OWN PAGE NO. 9 S3 E3

```
0323  REF   7 LAST 866     12,3553  11*463 0     CCS   GCOMPSW   ARE GYRO COMMANDS GREATER THAN 2 PULSES
0324  REF   3 LAST 865     12,3554  1 3433 1     TCF   1/GYRO     YES
0325  REF 100 LAST 866     12,3555  1 5567 1     TCF   ENDOFJOB   NO
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L IMU COMPENSATION PACKAGE USER'S OWN PAGE NO. 10 S3 E3

```
0326   REF 242 LAST 863     12,3556  56 002 0  FBIASSUB XCH    Q
0327   REF  59 LAST 866     12,3557  54 121 1           TS     BUF +1

0328   REF 243 LAST 868     12,3560  3 0002 0           CA     Q          NBD SCALED (GYRO PULSES)/(CS) X 2(-5)
0329                        12,3561  0 0006 1           EXTEND
0330   REF 322 LAST 866     12,3562  7 0144 1           MP     MPAC       DELTAT SCALED (CS) X 2(+19)
0331   REF  60 LAST 868     12,3563  50 120 1           INDEX  BUF
0332   REF  21 LAST 865     12,3564  21'456 0           DAS    GCOMP      HI(NBD)(DELTAT)   (GYRO PULSES) X 2(+14)

0333   REF 244 LAST 868     12,3565  3 0002 0           CA     Q          NOW FRACTIONAL PART
0334                        12,3566  0 0006 1           EXTEND
0335   REF 323 LAST 868     12,3567  7 0145 0           MP     MPAC +1
0336   REF 158 LAST 864     12,3570  54 001 1           TS     L
0337   REF 253 LAST 866     12,3571  3 7767 0           CAF    ZERO
0338   REF  61 LAST 868     12,3572  50 120 1           INDEX  BUF
0339   REF  22 LAST 868     12,3573  21'456 0           DAS    GCOMP      (NBD)(DELTAT)     (GYRO PULSES) X 2(+14)

0340   REF   1              12,3574  1 3420 0           TCF    DRFTSUB2   CHECK MAGNITUDE OF COMPENSATION


0341   REF   8 LAST 867     12,3575  11'463 0  LASTBIAS CCS    GCOMPSW    BYPASS IF GCOMPSW NEGATIVE
0342                        12,3576  1 3601 1           TCF    +3
0343                        12,3577  1 3601 1           TCF    +2
0344   REF 101 LAST 867     12,3600  1 5567 1           TCF    ENDOFJOB

0345   REF   2 LAST 675     12,3601  3 5652 0           CAF    PRIO31     2 SECONDS SCALED (CS) X 2(+8)
0346   REF   8 LAST 866     12,3602  56 765 0           XCH    1/PIPADT
0347                        12,3603  4 0000 0           COM
0348   REF  10 LAST 856     12,3604  6 1307 1           AD     PIPTIME +1 TIME AT PIPAI = 0
0349   REF   1              12,3605  1 3517 0           TCF    NBD2


0350   REF   3 LAST 865     12,3606  3 3455 0  GCOMPZER CAF    LGCOMP     ROUTINE TO ZERO GCOMP BEFORE FIRST
0351   REF  61 LAST 863     12,3607  56 003 1           XCH    EBANK      CALL TO 1/PIPA
0352   REF   6 LAST 863     12,3610  54 153 1           TS     MODE

0353   REF 254 LAST 868     12,3611  3 7767 0           CAF    ZERO
0354   REF   9 LAST 868     12,3612  55'463 0           TS     GCOMPSW
0355   REF  23 LAST 868     12,3613  55'455 0           TS     GCOMP
0356   REF  24 LAST 868     12,3614  55'456 0           TS     GCOMP +1
0357   REF  25 LAST 868     12,3615  55'457 1           TS     GCOMP +2
0358   REF  26 LAST 868     12,3616  55'460 0           TS     GCOMP +3
0359   REF  27 LAST 868     12,3617  55'461 1           TS     GCOMP +4
0360   REF  28 LAST 868     12,3620  55'462 1           TS     GCOMP +5

0361   REF   7 LAST 868     12,3621  3 0153 0           CA     MODE
0362   REF  62 LAST 868     12,3622  54 003 0           TS     EBANK
0363   REF   8 LAST 863     12,3623  1 5221 1           TCF    SWRETURN   RETURN TO CALLER
```

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L       DUMMY 206 INITIALIZATION                                        USER'S OWN PAGE NO.  1          S3

R00002  PROGRAM NAME - BEGIN206
R00004  MOD. NO. 3
R00006  MOD BY - D. LICKLY AND J. SAMPSON
R00008  DATE - NOV. 22, 1966
R0001   LOG SECTION - DUMMY 206 INITIALIZATION
R00012  ASSEMBLY - SUNBURST REVISION 36

R00014  FUNCTIONAL DESCRIPTION - START UP TO TWO DELAYED JOBS OR TASKS AFTER SLAP1 FOR SIMULATION PURPOSES.

R00024  FIXED INITIALIZATION REQUIRED - PATCH STARTDT1 AND STARTDT2 TO REPRESENT THE TIME2,TIME1 VALUE AT THE TIME AT
R00028                                    WHICH THE JOBS OR TASKS ARE TO BEGIN
R0003                                   PATCH CADR1 AND CADR2 IF SOME OTHER TASKS THAN TASK1 AND TASK2 ARE TO BE USED
R00034                                  PATCH CADR3 AND CADR4 TO THE 2CADR OF THE JOBS TO BE STARTED
R00038                                  PATCH 206BEGIN TO TC ENDOFJOB IF ONLY ONLY ONE TASK OR JOB IS TO BE STARTED
R00042                                  PATCH TASK1 AND TASK2 WITH DIFFERENT PRIORITIES IF DESIRED
R00046  SUBROUTINES CALLED - FINDVAC, WAITLIST

R00048  NORMAL EXIT MODES - ENDOFJOB, TASKOVER

R0005   ALARM OR ABORT EXIT MODES - NONE

R00052  OUTPUT - 2 WAITLIST OR FINDVAC CALLS FOR THE 2CADRS PATCHED IN

R00054  ERASABLE INITIALIZATION REQUIRED - NONE

R00056  DEBRIS - ITEMP1, CENTRALS, ERASABLES IN SUBROUTINES CALLED

R00058  NOTES - SINCE ONLY THE LOW ORDER PART OF STARTDT1 AND STARTDT2 ARE USED TO COMPUTE THE DELTAT FOR WAITLIST, THE
R00062    REQUIRED TASKS AND JOBS WILL BE CALLED WITHIN 163.84 SECONDS


 0010                                  35,3546          BANK   35

 0020                    35,3546  0 0004 0  BEGIN206 INHINT

 0030   REF  19 LAST 866 35,3547  4 0025 1           CS     TIME1          PATCH SLAP1 TO COME HERE TO START UP TWO
 0040   REF   1          35,3550  6 3573 0           AD     STARTDT1 +1      DELAYED TASKS OR JOBS FOR SIMULATIONS
 0050   REF  46 LAST 832 35,3551  6 7746 0           AD     BIT14
 0060   REF  47 LAST 869 35,3552  6 7746 0           AD     BIT14
 0070   REF  83 LAST 822 35,3553 56 061 0           XCH    ITEMP1

 0080   REF  84 LAST 869 35,3554  3 0061 0           CA     ITEMP1
 0090   REF 123 LAST 858 35,3555  0 5663 1           TC     WAITLIST
 0095   REF  85 LAST 869                 E0          EBANK= ITEMP1
 0100                    35,3556  03576 0  CADR1     2CADR  TASK1          MAY BE PATCHED FOR ANOTHER TASK
 C0100  REF   1          35,3557  72060 1
 0110   REF  20 LAST 869 35,3560  4 0025 1  206BEGIN CS     TIME1          PATCH TO TC ENDOFJOB TO START 1 TASK
 0120   REF   1          35,3561  6 3575 0           AD     STARTDT2 +1
 0130   REF  48 LAST 869 35,3562  6 7746 0           AD     BIT14
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L DUMMY 2D6 INITIALIZATION USER'S OWN PAGE NO. 2 53

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0140   REF  49 LAST 869     35,3563  6 7746 0          AD      BIT14
0150   REF  86 LAST 869     35,3564  56 061 0          XCH     ITEMP1

0160   REF  87 LAST 870     35,3565  3 0061 0          CA      ITEMP1
0170   REF 124 LAST 869     35,3566  0 5663 1          TC      WAITLIST
0175   REF  88 LAST 870                   E0          EBANK=  ITEMP1
0180                        35,3567   03603 1 CADR2    2CADR   TASK2          COULD BE PATCHED
C0180  REF   1              35,3570   72060 1
0190   REF 102 LAST 868     35,3571  0 5567 0          TC      ENDOFJOB


0200                        35,3572   00000 1 STARTDT1 2DEC    600            PATCH
C0200                       35,3573   01130 1
0210                        35,3574   00000 1 STARTDT2 2DEC    200            PATCH
C0210                       35,3575   00310 0
0220   REF   4 LAST 674     35,3576  3 5641 1 TASK1    CAF     PRIO15         ..OK YOUR OWN PRIORITY..
0230   REF  29 LAST 819     35,3577  0 5516 0          TC      FINDVAC
0240                        35,3600   77777 0 CADR3    DCT     77777          BETTER PATCH A 2CADR HERE
0250                        35,3601   77777 0          DCT     77777
0260   REF 116 LAST 857     35,3602  0 5727 0          TC      TASKOVER

0270   REF   9 LAST 823     35,3603  3 7746 0 TASK2    CAF     PRIO20
0280   REF  30 LAST 870     35,3604  0 5516 0          TC      FINDVAC
0290                        35,3605   77777 0 CADR4    DCT     77777          ..HERE ALSO..
0300                        35,3606   77777 0          DCT     77777
0310   REF 117 LAST 870     35,3607  0 5727 0          TC      TASKOVER
```

L SECOND DPS GUIDANCE USER'S OWN PAGE NO. 1 53

R0001
R0002 PROGRAM NAME - SECOND DPS GUIDANCE

R0003 MOD NO. - 0

R0004 MODIFICATION BY - KLUMPP AND EYLES

R0005 FUNCTIONAL DESCRIPTION -

R0006 THERE ARE TWO MODES OF OPERATION OF THE SECOND DPS GUIDANCE PROGRAM (2DPS). PRIOR TO THE IGNITION
R0008 SEQUENCE 2DPS IS OPERATED IN THE PRE-IGNITION MODE FOR THE PURPOSE OF PROVIDING, FOR THE IGNITION
R0010 SEQUENCE, THE TIME OF INITIATION AND THE DIRECTION OF THRUST. IMMEDIATELY AFTER THE IGNITION SEQUENCE
R0012 IS COMPLETED, INCLUDING THE COMMAND OF MAXIMUM THRUST, 2DPS IS ENGAGED IN THE THRUSTING MODE FOR THE
R0014 PURPOSE OF PROVIDING THRUST ACCELERATION MAGNITUDE AND DIRECTION COMMANDS NECESSARY TO CONDUCT THE
R0016 SIMULATED POWERED LANDING MANEUVER.

R0017 PRIOR TO LAUNCH, ERASABLE MEMORY MUST BE LOADED WITH THE SEMI-UNIT NORMAL TO THE PLANE OF THE
R0019 REQUIRED ORBIT CP16/2, AND DATA WHICH INDIRECLY SPECIFICIES THE NOMINAL IGNITION TIME TIGNOM. THESE
R0021 DATA MAY BE ADJUSTED, AS A GROUP, VIA THE UPLINK, UNTIL 200 SECONDS PRIOR TO THE TIGNOM IMPLIED BY THE
R0023 PRE-LAUNCH LOAD OR IMPLIED BY THE UPLINK DATA, WHICHEVER IS EARLIER. A DESCRIPTION OF THE METHOD OF
R0025 UPDATING TIGNOM IS IN THE PROVINCE OF THE MISSION CONTROL PROGRAM (MCP) MISSION PHASE 11 -
R0027 DPS2/PIIH/APS1. THE TARGETING IS CONTROLLED BY THE SEMI-UNIT VECTOR CP16/2 AS DESCRIBED IN THE 206 GSOP.

R0029 AT APPROXIMATELY 180 SECONDS PRIOR TO TIGNOM, THE MCP ENGAGES 2DPS IN THE PRE-IGNITION MODE BY
R0031 PROVIDING AN EXTRAPOLATED TIME AND STATE IN THE REGISTERS TET, RIGNTION, VIGNTION, AND TRANSFERRING
R0033 CONTROL TO LOCATION PREBURN IN 2DPS. THIS TIME AND STATE ARE AT APPROXIMATELY 50 SECONDS PRIOR TO
R0035 TIGNOM. (THE NAMES RIGNTION, VIGNTION, CHOSEN TO INDICATE USAGE WITH OTHER GUIDANCE PROGRAMS, ARE
R0037 MISLEADING WITH 2DPS IN THAT THE EXTRAPOLATED STATE PROVIDED IN THESE REGISTERS IS NOT THAT EXPECTED AT
R0039 IGNITION BUT RATHER AT 50 SECONDS PRIOR TO IGNITION.) 2DPS TRANSFERS THE CONTENTS OF TET TO PIPTIME
R0041 AND CALLS SUBROUTINE VPATCHER WHICH TRANSFERS THE STATE TO RN, VN AND INITIALIZES FOR CALCRVG.
R0043 USING CALCRVG AS A SUBROUTINE, AND INTERNAL SUBROUTINES IGNITN1 AND IGNITN2, 2DPS MOVES THE TIME AND
R0045 STATE FORWARD TO A TIME GREATER THAN OR EQUAL TO TULLG-6 SECONDS AND LESS THAN OR EQUAL TO TULLG-3.6 SECONDS,
R0047 LEAVING THIS CONSISTENT SET IN PIPTIME, RN, VN, WHERE TULLG IS THE PRECISE TIME FOR ULLAGE TO BE INITIATED
R0049 AND IS LEFT IN THE REGISTER OF THAT NAME. 2DPS LEAVES A SEMI-UNIT VECTOR IN THE DIRECTION IN WHICH
R0051 THRUST IS TO BE COMMANDED DURING THE IGNITION SEQUENCE IN THE REGISTER POINTVSM AND BRANCHES TO
R0053 LOCATION RETPREB IN THE MISSION CONTROL PROGRAM.

R0054 USING THE DATA LEFT BY THE PRE-IGNITION MODE OF 2DPS, THE MCP ENGAGES KALCMANU TO PROPERLY
R0056 ORIENT THE SPACECRAFT FOR THE IGNITION SEQUENCE, AND ISSUES THE WAITLIST CALLS WHICH CAUSE THE
R0058 READACCS, SERVICER, PGNCSMON LOOP TO BE ESTABLISHED (WITH 2DPS NOT IN THE LOOP) AND PRODUCE ULLAGE,
R0060 ENGINE IGNITION, AND FINALLY MAXIMUM THRUST. IMMEDIATELY AFTER MAXIMUM THRUST IS COMMANDED, THE MCP
R0062 PLACES THE 2BCADR OF BURN (EBANK= E2DPS) IN THE AVGEXIT WHICH CAUSES 2DPS TO BE ADDED TO THE READACCS,
R0064 SERVICER, PGNCSMON LOOP IMMEDIATELY FOLLOWING CALCRVG.

R0065 WHEN CONTROL IS GIVEN TO 2DPS WITH THE 2BCADR OF BURN IN AVGEXIT, 2DPS OPERATES IN THE THRUSTING
R0067 MODE. IT GENERATES THE SEQUENCING REQUIRED TO CONDUCT THE SIMULATED POWERED LANDING MANEUVER AND ISSUES
R0069 THE THRUST ACCELERATION MAGNITUDE AND DIRECTION COMMANDS.

R0070 2DPS GENERATES THE SEQUENCING BY INCREMENTING THE HIGH ORDER PART OF AVGEXIT, BY AN APPROPRIATE
R0072 INTEGER, TO ACCOMPLISH EACH CHANGE OF 2DPS PHASE. THE INCREMENTING OF AVGEXIT CAUSES, ON THE SUBSEQUENT

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R0074 PASS THROUGH 2DPS, CONTROL TO BEGIN AT A NEW POINT IN THE SECOND DPS FLITE SEQUENCE TABLE, AND
R0076 CONSEQUENTLY THE CORRESPONDING 2DPS MODING TO BE ESTABLISHED.

R0077 2DPS GENERATES THE THRUST ACCELERATION MAGNITUDE AND DIRECTION COMMANDS ON THE BASIS OF THE
R0079 CONTENTS OF PIPTIME, RN, VN, AT THE BEGINNING OF THE PASS. TO ISSUE THE THRUST ACCELERATION DIRECTION
R0081 COMMAND, 2DPS PLACES A SEMI-UNIT VECTOR IN THE REQUIRED DIRECTION IN THE REGISTER AXISD AND CALLS
R0083 FINDCDUD AS A SUBROUTINE. TO ISSUE THE MAGNITUDE COMMAND, 2DPS PLACES THE REQUIRED MAGNITUDE IN THE
R0085 REGISTER /ACF/ AND CALLS THROTCON AS A SUBROUTINE.

R0086 BEFORE BUT NOT INCLUDING THE LAST PASS, 2DPS TERMINATES THE JOB PERIODICALLY STARTED BY READACCS
R0088 BY BRANCHING TO ENDOFJOB.

R0089 ON THE LAST PASS 2DPS PLACES THE SEMI-UNIT VECTOR ALONG THE NORMAL TO THE DESIRED ORBITAL PLANE,
R0091 CPT6/2, IN THE REGISTER AXISD, CALLS FINDCDUD, AND BRANCHES TO LOCATION RETBURN IN THE MCP. THE MCP
R0093 REMOVES 2DPS FROM THE READACCS, SERVICER, PGNCSMON LOOP AND ISSUES THE WAITLIST CALLS WHICH PRODUCE THE
R0095 RANDOM THROTTLING. THE MCP DOES NOT CHANGE THE CONTENTS OF AXISD SUPPLIED BY 2DPS. CONSEQUENTLY THE
R0097 THRUST ACCELERATION DURING RANDOM THROTTLING IS NORMAL TO THE ORBITAL PLANE.

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P0099 INTERFACE SPECIFICATIONS -

R0100	SPECIFICATION	PRE-IGNITION MODE	THROTTING MODE
R0101	CALLING SEQUENCE -	DTCB TO PREBURN	DTCB TO BURN
R0102		(EBANK= E2DPS)	(EBANK= E2DPS)
R0103	NORMAL EXITS -	DTCB TO LOCATION	PRIOR TO LAST PASS -
R0104		RETPREB (EBANK=	TC TO ENDOPJOB
R0105		EMPTIJOB) IN MISSION	
R0106		CONTROL PROGRAM.	LAST PASS -
R0107			DTCB TO LOCATION
R0108			RETBURN (EBANK=
R0109			EMPTIJOB) IN MISSION
R0110			CONTROL PROGRAM
R0111	ABORT EXITS -	NONE	NONE
R0112	ALARMS -	ON OVERFLOW PRIOR TO OR	SAME
R0113		DURING COMPUTATION OF	
R0114		ACS OR AFCS,	IN ADDITION, IF OVERFLOW
R0116		SET ALARM 00410	OCCURS AFTER COMPUTATION
R0118		AND RETAIN THE VARIABLES	OF THE AFOREMENTIONED
R0119		COMPUTED ON THE PREVIOUS	VARIABLES,
R0120		PASS.	SET ALARM 00412
R0121			AND SKIP ISSUANCE OF
R0122		ON OVERFLOW DURING	ATTITUDE AND THROTTLE
R0123		COMPUTATION OF AFCS ,	COMMANDS.
R0124		I	
R0125		(YIELDS POSMAX),	
R0126		RETAIN POSMAX AND	
R0127		SET ALARM 00411.	
R0128	ERAS INITIALIZATION -	CPT6/2 (IMU COORDS)	2BCADR OF BURN
R0129		OTHER INITIALIZATION	(EBANK= E2DPS) MUST
R0130		DONE INTERNALLY	BE IN AVGEXIT. OTHER
R0131			INITIALIZATION DONE IN
R0133			PRE-IGNITION MODE.
R0134	INPUTS -	TET	PIPTIME
R0135		RIGNTION	RN
R0136		VIGNTION	VN
R0137	OUTPUTS -	PIPTIME	AXISD
R0138		RN	/ACF/
R0139		VN	
R0140		TGLLG	
R0141		POINTVSM	
R0142	ERASABLES -	AMEMORY THROUGH	SAME

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```
R0143                          AMEMORY +215 OCT
R0144                          PLUS CPT672 IN
R0145                          NON SHARABLE E4LOAD

R0146   SUBROUTINES CALLED -  ROOTPSRS              ROOTPSRS
R0147                          VPATCHER              FINDCDUD
R0148                          CALCRVG               THROTCON

R0149
```

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```
 0150                                  22,2000          BANK    22
 0151   REF   4 LAST 751                 E4             EBANK=  E2DPS
R0152   ************************************************************************
R0153   INITIALIZATION OF SECOND DPS GUIDANCE - PREBURN
R0154   ************************************************************************

 0155   REF   1                        22,2000  PREBURN =      INIT2DPS
 0156   REF   1              22,2000   0 3531 0  INIT2DPS TC     PRETINIT        INITIALIZES INTERPRETER

R0157   CLEAR ORBITAL INTEGRATION VARIABLES FROM REGISTERS IN COMMON WITH 2DPS

 0158   REF  83 LAST 847     22,2001   0 6112 0           TC     INTPRET
 0159                        22,2002    77745 1          DLOAD
 0160   REF   8 LAST 776     22,2003    02047 0                 TET             EXTRAPOLATED TIME FROM ORBITAL INTEGRATN
 0161   REF  11 LAST 868     22,2004    35307 0          STCALL PIPTIME         TIME REGISTER OF PIPASR
 0162   REF   3 LAST 729     22,2005    60436 0                 VPATCHER        TRANSFERS RIGNTION, VIGNTION TO RN, VN,
 0163                        22,2006    77776 1          EXIT                   AND DUPLICATES FUNCTIONS OF NORMLIZE
 0164   REF 127 LAST 858     22,2007   0 4161 0           TC     PHASCHNG        PRE-IGNITION MODE: START 2DPS PROTECTN,
 0165                        22,2010    05022 1  +502    UCT    05022           ESTABLISHING PRIORITY.
 0166                        22,2011    20000 0          UCT    20000           PREVENT REREADING ORBITAL INTEGRATION
A0167                                                                           VARIABLES AFTER WRITING OVER THEM.
R0168   COMMON REGISTERS ARE CLEARED

 0169   REF  84 LAST 875     22,2012   0 6112 0           TC     INTPRET
 0170                        22,2013    77745 1          DLOAD
 0171   REF   1              22,2014    05707 1                 IGNALGL
 0172   REF  21 LAST 823     22,2015    25073 1          STOVL  AVGEXIT         SET UP RETURN ADDRESS IN AVGEXIT
 0173   REF   1              22,2016    05722 0                 ZEROPOS
 0174   REF   2 LAST  37     22,2017    02211 1          STORE  GDOTM1          DERIVATIVE OF G FOR USE BY IGNITN1
 0175   REF   2 LAST  37     22,2020    16167 0          STODL  UNITC/2
 0176   REF   2 LAST 875     22,2021    05722 0                 ZEROPOS
 0177   REF   2 LAST  36     22,2022    02055 0          STORE  TIF/41MP        ZERO AS IF COMING FROM PREVIOUS PHASE
 0178                        22,2023    77776 1          EXIT
 0179   REF   3 LAST 875     22,2024   3 3721 0           CA     ZEROPOS
 0180   REF   2 LAST  36     22,2025   55'402 1           TS     PIPASSO         SHOWS THIS IS INITIAL PASS THIS PHASE
 0181   REF   1              22,2026   0 3343 0           TC     XTRIPIP         SETS TPIP EXTRAPOLATED
 0182   REF  48 LAST 866     22,2027   3 7743 0           CA     POSMAX
 0183   REF   2 LAST  37     22,2030   55'562 0           TS     /AFC/           FORCES INITIALIZATION OF COUNTFC
 0184   REF   3 LAST 875     22,2031   55'563 1           TS     /AFC/    +1     ONLY REASON: TO ASSURE GOOD PARITY
 0185   REF   2 LAST  36     22,2032   55'404 1           TS     COUNTFC1        ONLY REASON: TO ASSURE GOOD PARITY
 0186   REF  22 LAST 875     22,2033   0 1072 0           TC     AVGEXIT         RETURNS TO APPROPRIATE LOCATION IN 2DPS
```

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```
R0187   ************************************************************************
R0188   SECOND DPS FLITE SEQUENCE TABLE
R0189   ************************************************************************

R0190   INDIRECT ADDRESSES

 0191   REF   1                          22,2043  BURN     =       QUADOX
 0192                                     0001    BRTTFNO  =       1
 0193                                     0002    PARL     =       2
 0194                                     0003    TBRL     =       3
 0195                                     0004    MOD2DPS  =       4
 0196                                     0005    TTF/4CR  =       5
 0197                                     0006    BRXEND   =       6

 0198   REF   1                22,2034  1 2234 1  IGNALG   TCF     TTFINCR
 0199   REF   1                22,2035  1 2216 1           TCF     ADTTFNO         AS IF COMING FROM PREVIOUS PHASE
 0200                          22,2036  00000 1            OCT     00000
 0201   REF   1                22,2037  02124 1            ADRES   TBRIGAL
 0202                          22,2040  00032 0            OCT     00032
 0203                          22,2041  77664 0            DEC     -1.5 E 2 B -15  -1.5 SECONDS, TTF UNITS, COMPARES TTF/4
 0204   REF   1                22,2042  1 2741 0           TCF     EXITGEND

 0205   REF   2 LAST 876       22,2043  1 2234 1  QUADOX   TCF     TTFINCR
 0206   REF   1                22,2044  1 2233 0           TCF     RETTFNO         AS IF CONTINUING PREBURN PHASE
 0207                          22,2045  00000 1            OCT     00000
 0208   REF   1                22,2046  02130 1            ADRES   TBRQUAD
 0209                          22,2047  00042 1            OCT     00042
 0210                          22,2050  73465 1            DEC     -045 E 2 B -15  -045 SECONDS, TTF UNITS, COMPARES TTF/4
 0211   REF   1                22,2051  1 3017 0           TCF     EXQDLIN

 0212   REF   3 LAST 876       22,2052  1 2234 1  QUADOF   TCF     TTFINCR
 0213   REF   2 LAST 876       22,2053  1 2216 1           TCF     ADTTFNO
 0214                          22,2054  00027 1            OCT     00027
 0215   REF   2 LAST 876       22,2055  02130 1            ADRES   TBRQUAD
 0216                          22,2056  00042 1            OCT     00042
 0217                          22,2057  77551 0            DEC     -3.0 E 2 B -15  -3.0 SECONDS, TTF UNITS, COMPARES TTF/4
 0218   REF   2 LAST 876       22,2060  1 3017 0           TCF     EXQDLIN

 0219   REF   1                22,2061  1 3271 1  LINGOF   TCF     LSETEVN
 0220   REF   2 LAST 876       22,2062  1 2233 0           TCF     RETTFNO
 0221                          22,2063  00027 1            OCT     00027
 0222   REF   1                22,2064  02134 0            ADRES   TBRLING
 0223                          22,2065  00042 1            OCT     00042
 0224                          22,2066  77746 1            DEC     -.50 E 2 B -15  -.50 SECONDS, TTF UNITS, COMPARES TTF/4
 0225   REF   3 LAST 876       22,2067  1 3017 0           TCF     EXQDLIN
```

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```
0226  REF  1            22,2070  1 3312 0  LING1F  TCF   LSETODD
0227  REF  3 LAST 876   22,2071  1 2216 1           TCF   ADTIFNU
0228                    22,2072   00056 1           OCT   00056
0229  REF  2 LAST 876   22,2073   02134 0           ADRES TBRLING
0230                    22,2074   00042 1           OCT   00042
0231                    22,2075   77746 1           DEC   -.50 E 2 B -15  -.50 SECONDS, TTF UNITS, COMPARES TIF/4
0232  REF  4 LAST 876   22,2076  1 3017 0           TCF   EXGOLIN

0233  REF  4 LAST 876   22,2077  1 2234 1  QUAD2F  TCF   TIFINCR
0234  REF  4 LAST 877   22,2100  1 2216 1           TCF   ADTIFNU
0235                    22,2101   00065 1           OCT   00065
0236  REF  3 LAST 876   22,2102   02130 1           ADRES TBRQUAD
0237                    22,2103   00043 0           OCT   00043
0238                    22,2104   77551 0           DEC   -3.0 E 2 B -15  -3.0 SECONDS, TTF UNITS, COMPARES TIF/4
0239  REF  5 LAST 877   22,2105  1 3017 0           TCF   EXGOLIN

0240  REF  2 LAST 876   22,2106  1 3271 1  LING2F  TCF   LSETEVN
0241  REF  3 LAST 876   22,2107  1 2233 0           TCF   RETTIFNU
0242                    22,2110   00065 1           OCT   00065
0243  REF  3 LAST 877   22,2111   02134 0           ADRES TBRLING
0244                    22,2112   00043 0           OCT   00043
0245                    22,2113   77746 1           DEC   -.50 E 2 B -15  -.50 SECONDS, TTF UNITS, COMPARES TIF/4
0246  REF  6 LAST 877   22,2114  1 3017 0           TCF   EXGOLIN

0247  REF  2 LAST 877   22,2115  1 3312 0  LING3F  TCF   LSETODD
0248  REF  5 LAST 877   22,2116  1 2216 1           TCF   ADTIFNU
0249                    22,2117   00114 0           OCT   00114
0250  REF  4 LAST 877   22,2120   02134 0           ADRES TBRLING
0251                    22,2121   00043 0           OCT   00043
0252                    22,2122   77763 0           DEC   -.25 E 2 B -15  -.25 SECONDS, TTF UNITS, COMPARES TIF/4
0253  REF  1            22,2123  1 3043 1           TCF   EXFINAL
```

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```
R0254   ************************************************************************
R0255   SECOND DPS ROAD MAPS (BRANCH TABLES)
R0256   ************************************************************************.

R0257   INDIRECT ADDRESSES

 0258                                          0000  BRIGN1  =      0
 0259                                          0001  BRLING  =      1
 0260                                          0002  BRIGN2  =      2
 0261                                          0003  BRXMID  =      3

 0262   REF   1              22,2124  1 3077 0  TBRIGAL  ICF    IGNIIN1
 0263   REF   1              22,2125  1 2442 0           ICF    TIF/4CL
 0264   REF   1              22,2126  1 3172 1           ICF    IGNIIN2
 0265   REF   1              22,2127  1 2702 1           ICF    EXIGMID

 0266   REF   1              22,2130  1 2210 1  TBRQUAD  ICF    RETIGN1
 0267   REF   2 LAST 878     22,2131  1 2442 0           ICF    TIF/4CL
 0268   REF   1              22,2132  1 2615 0           ICF    RETIGN2
 0269   REF   7 LAST 877     22,2133  1 3017 0           ICF    EXGDLIN

 0270   REF   2 LAST 878     22,2134  1 2210 1  TBRLING  ICF    RETIGN1
 0271   REF   1              22,2135  1 3326 1           ICF    LINGUID
 0272   REF   2 LAST 878     22,2136  1 2615 0           ICF    RETIGN2
 0273   REF   8 LAST 878     22,2137  1 3017 0           ICF    EXGDLIN
```

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```
P0274   ************************************************************************
R0275   INITIALIZATION FOR EACH PASS
R0276   ************************************************************************

R0277   NTLZPASS SETS INDICES, FILLS TPIPOLD, TPIP, R, V EVERY PASS; BRANCHES TO IGNITNI, ADTTFND WHEN APPROPRIATE.

 0279                        22,2140  0 0006 1  NTLZPASS EXTEND
 0280   REF   2 LAST  36     22,2141  23'406 1          DXCH   RETNTLZ        SAVE RETURN ADDRESS

 0281   REF  23 LAST 875     22,2142  4 1072 1          CS     AVGEXIT
 0282   REF   2 LAST 875     22,2143  6 3706 0          AD     IGNALGL
 0283                        22,2144  0 0006 1          EXTEND
 0284   REF   1              22,2145  1 2152 1          BZF    NTLZPSS1       BRANCH IF AND ONLY IF PRE-IGNITION MODE

 0285   REF  47 LAST 852     22,2146  0 4141 1          TC     2PHSCHNG       THRUSTING MODE, FIRST PHASCHNG IN 2DPS:
 0286                        22,2147   00035 1          DCI    00035          IN GROUP 5, RETAIN ONLY PIPA TASK.
 0287                        22,2150   05022 1  +502    DCI    05022          IN GROUP 2 START 2DPS PROTECTION
 0288                        22,2151   20000 0          DCI    20000          WITH PRIORITY 20.

 0289   REF   2 LAST 875     22,2152  0 3531 0  NTLZPSS1 TC     PRETINIT       INITIALIZES INTERPRETER

R0290   SET MODE

 0291   REF  24 LAST 879     22,2153  51'072 0          INDEX  AVGEXIT
 0292   REF   1              22,2154  3 0004 0          CA     MOD2DPS
 0293   REF   1              22,2155  0 4122 1          TC     NEWMODEA

R0294   SET INDICES

 0295                        22,2156  0 0006 1          EXTEND
 0296   REF  25 LAST 879     22,2157  5 1072 0          INDEX  AVGEXIT
 0297   REF   1              22,2160  3 0003 1          DCA    PARL
 0298   REF   2 LAST  36     22,2161  53'401 1          DXCH   NDX2DPS
 0299                        22,2162  0 0006 1          EXTEND
 0300   REF   3 LAST 879     22,2163  4 1401 1          DCS    NDX2DPS
 0301   REF  31 LAST 840     22,2164  50 110 1          INDEX  FIXLOC
 0302   REF   7 LAST 790     22,2165  52 047 0          DXCH   X1             LOADS BOTH INTRP NDX REGS, NEEDED OR NOT

R0303   FILL IPIPOLD AND TPIP

 0304                        22,2166  0 0006 1          EXTEND
 0305   REF   2 LAST  36     22,2167  3 1447 1          DCA    TPIP
 0306   REF   2 LAST  36     22,2170  53'451 1          DXCH   TPIPOLD
 0307   REF 128 LAST 875     22,2171  0 4161 0          TC     PHASCHNG       PROTECT TPIPOLD AND
 0308                        22,2172   04022 0  +402    DCI    04022          PREVENT RETURNING TO PREVIOUS PROGRAM
 0309                        22,2173  0 0006 1          EXTEND
 0310   REF  12 LAST 875     22,2174  3 1307 1          DCA    PIPTIME
 0311   REF   3 LAST 879     22,2175  53'447 0          DXCH   TPIP

R0312   FILL R AND V
```

```
 0313   REF  85 LAST 875     22,2176  0 6112 0           IC      INTPRET
 0314                        22,2177  77775 1            VLOAD
 0315   REF  14 LAST 843     22,2200  01011 0                    RN
 0316   REF   2 LAST  36     22,2201  26061 1            STOVL   R              RN TO R WITHOUT RESCALING
 0317   REF  14 LAST 843     22,2202  01017 0                    VN
 0318                        22,2203  77742 0            VSR2
 0319   REF   2 LAST  36     22,2204  02067 1            STORE   V              VN TO V WITH SCALING ADJUSTMENT
 0320                        22,2205  77776 1            EXIT

R0321   IGNITN1 AND ADTTFNU BRANCH DECISIONS

 0322   REF   2 LAST  36     22,2206  51'401 0           INDEX   NDXBR
 0323   REF   1              22,2207  1 0000 0           TCF     BRIGN1         TO IGNITN1 WHEN APPROPRIATE

 0324   REF 129 LAST 879     22,2210  0 4161 0  RETIGN1  TC      PHASCHNG       RETURN HERE WHETHER OR NOT DO IGNITN1.
 0325                        22,2211  04022 0   +402     OCT     04022          PROTECT TTF/4IMP AS USED BY IGNITN1 FROM
A0326                                                                           WIPEOUT BY ADTTFNU AND TTFINCR. ALSO
A0327                                                                           PROTECT RTEMP, VTEMP, GDOTM1T FROM
A0328                                                                           RS, VS, ASPRT, (TIME SHARED)

 0329   REF   3 LAST 875     22,2212  11'402 1           CCS     FLPASSO
 0330   REF   5 LAST 877     22,2213  1 2235 0           TCF     TTFINCR   +1 ON OTHER THAN FIRST PASS IN ANY PHASE.
 0331   REF  26 LAST 879     22,2214  51'072 0           INDEX   AVGEXIT
 0332   REF   1              22,2215  1 0001 1           TCF     BRTTFNU        TO ADTTFNU WHEN APPROPRIATE

R0333   ADD TTF/4NU TO TTF/4 FROM LAST PASS

 0334                        22,2216  0 0006 1  ADTTFNU  EXTEND
 0335   REF   2 LAST  36     22,2217  3 1453 1           DCA     TTF/4
 0336   REF   3 LAST 875     22,2220  53'455 0           DXCH    TTF/4IMP
 0337   REF   4 LAST 879     22,2221  51'400 1           INDEX   NDX2DPS
 0338   REF   1              22,2222  3 3562 0           CA      TTF/4NU
 0339   REF   4 LAST 880     22,2223  27'454 1           ADS     TTF/4IMP
 0340   REF 130 LAST 880     22,2224  0 4161 0           TC      PHASCHNG       PROTECT TTF/4
 0341                        22,2225  04022 0   +402     OCT     04022
 0342                        22,2226  0 0006 1           EXTEND
 0343   REF   5 LAST 880     22,2227  3 1455 1           DCA     TTF/4IMP
 0344   REF   3 LAST 880     22,2230  53'453 0           DXCH    TTF/4          RENEWED TTF/4

 0345   REF 131 LAST 880     22,2231  0 4161 0           TC      PHASCHNG       PROTECT TTF/4IMP FROM WIPEOUT BY TTFINCR
 0346                        22,2232  04022 0   +402     OCT     04022
 0347   REF   3 LAST 879     22,2233  0 1406 1  RETTFNU  TC      RETNTLZ

R0348   ************************************************************************
R0349   INCREMENT TTF/4
R0350   ************************************************************************

 0351   REF   1              22,2234  0 2140 0  TTFINCR  TC      NTLZPASS
```

```
0352                          22,2235  0 0006 1  +1        EXTEND
0353  REF   3 LAST 879       22,2236  4 1451 1            DCS     TPIPOLD
0354  REF 324 LAST 868       22,2237  52 145 0            DXCH    MPAC
0355                          22,2240  0 0006 1            EXTEND
0356  REF   4 LAST 879       22,2241  3 1447 1            DCA     TPIP
0357  REF 325 LAST 881       22,2242  20 145 0            DAS     MPAC
0358  REF   1                 22,2243  3 7750 1            CA      TSCALE
0359  REF   1                 22,2244  0 7375 1            TC      DMPNSUB        (TPIP-TPIPOLD)/4 TO MPAC, TTF UNITS

0360                          22,2245  0 0006 1            EXTEND
0361  REF   4 LAST 880       22,2246  3 1453 1            DCA     TTF/4
0362  REF 326 LAST 881       22,2247  20 145 0            DAS     MPAC           YIELDS INCREMENTED TTF/4 IN MPAC
0363  REF 327 LAST 881       22,2250  52 145 0            DXCH    MPAC
0364  REF   6 LAST 880       22,2251  53'455 0            DXCH    TTF/4IMP
0365  REF 132 LAST 880       22,2252  0 4161 0            TC      PHASCHNG       PROTECT TTF/4
0366                          22,2253   04022 0  +402      OCT     04022
0367                          22,2254  0 0006 1            EXTEND
0368  REF   7 LAST 881       22,2255  3 1455 1            DCA     TTF/4IMP
0369  REF   5 LAST 881       22,2256  53'453 0            DXCH    TTF/4          INCREMENTED TTF/4

R0370 ************************************************************************
R0371 SET UP STATE IN LOCAL, PLANE, SPHERICAL COORDINATES
R0372 ************************************************************************

0373  REF  49 LAST 875       22,2257  3 7743 0  STUP2DPS CA      POSMAX
0374  REF   2 LAST  37       22,2260  55'524 1            TS      CRS2           SET CRS2 TO MAXIMUM, RESET LATER ONLY IF
0375  REF   3 LAST 881       22,2261  55'525 0            TS      CRS2     +1    RC/RSO DOES NOT PRODUCE OVERFLOW

0376  REF  86 LAST 880       22,2262  0 6112 0            TC      INTPRET
0377                          22,2263  53575 0            VLOAD   UNIT
0378  REF   3 LAST 880       22,2264  02061 1                    R
0379  REF   2 LAST  36       22,2265  26012 0            STOVL   CLT/2          DEFINITION OF MATRIX CLT/2
0380  REF   4 LAST 326       22,2266  02357 1                    CPT6/2
0381                          22,2267  53435 0            VXV     UNIT
0382  REF   3 LAST 881       22,2270  02012 0                    CLT/2
0383  REF   4 LAST 881       22,2271  26020 1            STOVL   CLT/2 +6
0384  REF   5 LAST 881       22,2272  02012 0                    CLT/2
0385                          22,2273  76435 1            VXV     VSL1
0386  REF   6 LAST 881       22,2274  02020 1                    CLT/2 +6
0387  REF   7 LAST 881       22,2275  26026 1            STOVL   CLT/2 +14
0388  REF   3 LAST 880       22,2276  02067 1                    V
0389                          22,2277  76521 0            MXV     VSL1
0390  REF   8 LAST 881       22,2300  02012 0                    CLT/2          -     *     -
0391  REF   2 LAST  36       22,2301  26075 1            STOVL   VL             VL = 2 CLT/2 V
0392  REF   4 LAST 881       22,2302  02061 1                    R
0393                          22,2303  72441 0            DOT     SL1
0394  REF   5 LAST 881       22,2304  02357 1                    CPT6/2               - -
0395  REF   2 LAST  36       22,2305  02103 1            STORE   RP2            RP2 = R.CPT6
```

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0396			22,2306	63316 0		DSU	PDVL	PUSH DOWN RP2 SQUARED
0397	REF	5 LAST 881	22,2307	02061 1			R	
0398			22,2310	50235 0		VXV	DOT	
0399	REF	4 LAST 881	22,2311	02067 1			V	
0400	REF	6 LAST 881	22,2312	02357 1			CPT6/2	
0401			22,2313	77752 1		SL1		- - -
0402	REF	2 LAST 37	22,2314	26105 1		STODL	MAP2	MAP2 = 2 R*V.CPT6/2
0403	REF	6 LAST 882	22,2315	02061 1			R	
0404			22,2316	77646 0		ABVAL		-
0405	REF	3 LAST 37	22,2317	02111 1		STORE	RS	RS0 = ABVAL(R)
0406			22,2320	45316 1		DSU	DSU	PUSHING UP RP2 SQUARED
0407			22,2321	77766 0		SQRT		2 2
0408	REF	2 LAST 37	22,2322	02107 0		STORE	RC	RC = SQRT(RS0 -RP2)
0409			22,2323	51025 1		DSU	BPL	BRANCH IF RC/RS0 WOULD OVERFLOW
0410	REF	4 LAST 882	22,2324	02111 1			RS	
0411	REF	1	22,2325	44332 0			SRS2COMP	
0412			22,2326	56345 0		DLOAD	DDV	
0413	REF	3 LAST 882	22,2327	02107 0			RC	
0414	REF	5 LAST 882	22,2330	02111 1			RS	
0415	REF	4 LAST 881	22,2331	02125 0		STORE	CRS2	COSINE(RS2) = RC/RS0
0416			22,2332	56345 0	SRS2COMP	DLOAD	DDV	
0417	REF	3 LAST 881	22,2333	02103 1			RP2	
0418	REF	6 LAST 882	22,2334	02111 1			RS	
0419	REF	2 LAST 37	22,2335	02127 1		STORE	SRS2	SINE(RS2) = RP2/RS0
0420			22,2336	67562 1		SR1R	ARCSIN	
0421			22,2337	52405 1		DMP	SL3	
0422	REF	1	22,2340	05740 1			PI/4	
0423	REF	7 LAST 882	22,2341	16115 0		STODL	RS +4	RS2 = ARCSIN(RP2/RS0)
0424	REF	4 LAST 882	22,2342	02103 1			RP2	
0425			22,2343	77671 1		DDV		
0426	REF	4 LAST 882	22,2344	02107 0			RC	
0427	REF	2 LAST 37	22,2345	16131 0		STODL	TRS2	TANGENT (RS2) = RP2/RC
0428	REF	3 LAST 881	22,2346	02101 0			VL +4	
0429			22,2347	65271 0		DDV	PDDL	THIS PUSH DOWN IS FOR 3RD COMP OF VS.
0430	REF	8 LAST 882	22,2350	02111 1			RS	
0431	REF	4 LAST 882	22,2351	02077 0			VL +2	
0432			22,2352	65271 0		DDV	PDDL	THIS PUSH DOWN IS FOR 2ND COMP OF VS.
0433	REF	5 LAST 882	22,2353	02107 0			RC	
0434	REF	5 LAST 882	22,2354	02075 1			VL	
0435			22,2355	77666 1		VDEF		DEFINITION OF SPHERICAL VELOCITY VECTOR
0436	REF	3 LAST 37	22,2356	16117 1		STODL	VS	
0437	REF	4 LAST 882	22,2357	02121 1			VS +2	
0438			22,2360	77716 1		DSU		
0439			22,2361	41205 0		DMP	DMP	
0440	REF	3 LAST 882	22,2362	02127 1			SRS2	
0441	REF	5 LAST 882	22,2363	02125 0			CRS2	
0442			22,2364	41325 0		PDDL	DMP	
0443	REF	5 LAST 882	22,2365	02123 0			VS +4	
0444	REF	6 LAST 882	22,2366	02117 1			VS	
0445			22,2367	72471 0		DDV	SL1	

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```
0446  REF   9 LAST 882    22,2370  02111 1            RS
0447                      22,2371  57415 0      DAD   DCOMP
0448                      22,2372  41325 0      PDDL  DMP          THIS PUSH DOWN IS FOR 3RD COMP OF ASPRT.
0449  REF   7 LAST 882    22,2373  02121 1            VS +2
0450  REF   8 LAST 883    22,2374  02117 1            VS
0451                      22,2375  77671 1      DDV
0452  REF  10 LAST 883    22,2376  02111 1            RS
0453                      22,2377  41325 0      PDDL  DMP
0454  REF   3 LAST 882    22,2400  02131 0            TRS2
0455  REF   9 LAST 883    22,2401  02123 0            VS +4
0456                      22,2402  77605 1      DMP
0457  REF  10 LAST 883    22,2403  02121 1            VS +2
0458                      22,2404  72425 1      DSU   SL1

0459                      22,2405  77634 0      RTB
0460  REF  11 LAST 767    22,2406  33520 0            SGNAGREE     PREVENT OVERFLOW IN LINSET WHEN
                                                                   AFCS +2 =-POSMAX SGN( ASPRT +2)

0461                      22,2407  63525 0      PDDL  DSQ          THIS PUSH DOWN IS FOR 2ND COMP OF ASPRT.
0462  REF  11 LAST 883    22,2410  02111 1            RS
0463                      22,2411  77665 1      BDDV
0464  REF   1             22,2412  21203 0            MUEARTH
0465                      22,2413  63525 0      PDDL  DSQ
0466  REF  11 LAST 883    22,2414  02123 0            VS +4
0467                      22,2415  77605 1      DMP
0468  REF  12 LAST 883    22,2416  02111 1            RS                 THIS MONSTER ASPRT REPRESENTS
0469                      22,2417  63525 0      PDDL  DSQ                INCIDENTAL ACCELERATIONS; DUE
0470  REF   6 LAST 882    22,2420  02125 0            CRS2               TO GRAVITY, CORIOLIS FORCES,
0471                      22,2421  63525 0      PDDL  DSQ                AND SO FORTH.
0472  REF  12 LAST 883    22,2422  02121 1            VS +2
0473                      22,2423  41205 0      DMP   DMP
0474  REF  13 LAST 883    22,2424  02111 1            RS
0475                      22,2425  45215 0      DAD   DSU
0476                      22,2426  77666 1      VDEF               DEFINITION OF ASPRT
0477  REF   3 LAST  37    22,2427  02133 1      STORE ASPRT
0478                      22,2430  77776 1      EXIT
0479  REF 255 LAST 868    22,2431  3 7767 0     CA    ZERO               SECOND COMPONENTS
0480  REF  14 LAST 883    22,2432  55,512 1     TS    RS +2              OF RS AND VS ARE
0481  REF  15 LAST 883    22,2433  55,513 0     TS    RS +3              ZEROED HERE TO PREVENT
0482  REF  13 LAST 883    22,2434  55,520 0     TS    VS +2              OVERFLOW TROUBLE IN
0483  REF  14 LAST 883    22,2435  55,521 1     TS    VS +3              THE ACS EQUATION.
0484  REF 133 LAST 881    22,2436  0 4161 0     TC    PHASCHNG     TIME ONLY?
0485                      22,2437   04022 0  +402  OCT   04022
0486  REF   3 LAST 880    22,2440  51,401 0     INDEX NDXBR
0487  REF   1             22,2441  1 0001 1     TCF   BRLING       POSSIBLE BRANCH TO LINEAR GUIDANCE
```

```
P0488   ************************************************************************
R0489   TTF/4 COMPUTATION
R0490   ************************************************************************

0491                        22,2442  0 0006 1  TTF/4CL  EXTEND
0492    REF   5 LAST 880    22,2443  5 1400 1           INDEX  NDX2DPS
0493    REF   1             22,2444  3 3606 1           DCA    JDS2
0494    REF   2 LAST  36    22,2445  53'442 0           DXCH   TABLTTF +6      A(3) = JDS2 TO TABLTTF
0495                        22,2446  0 0006 1           EXTEND
0496    REF   6 LAST 884    22,2447  5 1400 1           INDEX  NDX2DPS
0497    REF   1             22,2450  3 3570 0           DCA    ADS +4
0498                        22,2451  20 001 1           DDOUBL
0499    REF 328 LAST 881    22,2452  52 145 0           DXCH   MPAC
0500    REF   1             22,2453  3 3736 0           CA     SP3/4
0501    REF   6 LAST 852    22,2454  0 7357 1           TC     SHORTMP         LEAVING  A(2) IN MPAC
0502    REF 329 LAST 884    22,2455  52 145 0           DXCH   MPAC
0503    REF   3 LAST 884    22,2456  53'440 1           DXCH   TABLTTF +4      A(2) = (6 ADS2)/4 TO TABLTTF
0504    REF  29 LAST 865    22,2457  3 7754 0           CA     BIT8
0505    REF   4 LAST 884    22,2460  55'443 1           TS     TABLTTF +10     FRACTIONAL PRECISION FOR TTF TO TABLE
0506                        22,2461  0 0006 1           EXTEND
0507    REF  15 LAST 883    22,2462  3 1523 1           DCA    VS      +4
0508    REF 330 LAST 884    22,2463  52 145 0           DXCH   MPAC
0509    REF   1             22,2464  3 3732 1           CA     SP3/8
0510    REF   7 LAST 884    22,2465  0 7357 1           TC     SHORTMP         YIELDS 6/16 VS2 IN MPAC
0511                        22,2466  0 0006 1           EXTEND
0512    REF   7 LAST 884    22,2467  5 1400 1           INDEX  NDX2DPS
0513    REF   1             22,2470  3 3604 0           DCA    VDS     +4
0514                        22,2471  20 001 1           DDOUBL
0515    REF 331 LAST 884    22,2472  52 145 0           DXCH   MPAC
0516    REF   5 LAST 884    22,2473  53'436 0           DXCH   TABLTTF +2      STORE 6/16 VS2 IN TABLTTF
0517    REF   1             22,2474  3 3733 0           CA     SP9/16
0518    REF   8 LAST 884    22,2475  0 7357 1           TC     SHORTMP         YIELDS 18/16 VDS2 IN MPAC
0519                        22,2476  0 0006 1           EXTEND
0520    REF  16 LAST 883    22,2477  4 1515 0           DCS    RS      +4
0521    REF 332 LAST 884    22,2500  52 145 0           DXCH   MPAC            -RS2 TO MPAC, FETCHING 18/16 VDS2
0522    REF   6 LAST 884    22,2501  21'436 0           DAS    TABLTTF +2      A(1) = (6 VS2+18 VDS2)/16

0523                        22,2502  0 0006 1           EXTEND
0524    REF   8 LAST 884    22,2503  5 1400 1           INDEX  NDX2DPS
0525    REF   1             22,2504  3 3576 0           DCA    RDS     +4
0526    REF 333 LAST 884    22,2505  20 145 0           DAS    MPAC            YIELDS -RS2+RDS2 IN MPAC
0527    REF   2 LAST 884    22,2506  3 3732 1           CA     SP3/8
0528    REF   9 LAST 884    22,2507  0 7357 1           TC     SHORTMP
0529                        22,2510  0 0006 1           EXTEND
0530    REF 334 LAST 884    22,2511  3 0145 1           DCA    MPAC
0531    REF   7 LAST 884    22,2512  53'434 1           DXCH   TABLTTF         A(0) =-24(RS2-RDS2)/64

0532                        22,2513  0 0006 1           EXTEND
0533    REF   6 LAST 881    22,2514  3 1453 1           DCA    TTF/4
0534    REF 335 LAST 884    22,2515  52 145 0           DXCH   MPAC            LOADS TTF/4 (INITIAL GUESS) INTO MPAC
```

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```
0535                          22,2516  0 0006 1          EXTEND
0536  REF   1                 22,2517  3 3711 0          DCA     TABLTTFL        LOADS A,L WITH TABLTTFL,2
0537  REF   1                 22,2520  0 3352 0          TC      ROOTPSRS        YIELDS TTF/4 IN MPAC
0538                          22,2521  0 0006 1          EXTEND
0539  REF 336 LAST 884        22,2522  3 0145 1          DCA     MPAC            FETCH TTF/4 KEEPING IT IN MPAC
0540  REF   7 LAST 884        22,2523  53*453 0          DXCH    TTF/4           CORRECTED TTF/4

0541  REF 134 LAST 883        22,2524  0 4161 0          TC      PHASCHNG        TIME ONLY?
0542                          22,2525   04022 0  +402     UCI     04022

R0543  ************************************************************************
R0544  QUADRATIC GUIDANCE - SPHERICAL ACCELERATION AS QUADRATIC TIME FUNCTION
R0545  ************************************************************************

A0546                                                                  -
A0547                                                                  ACS EQUATION IS PROGRAMMED LIKE THIS:
A0548                                                                                  - -
A0549                                                                        - -      1/2(RS-RDS)
A0550                                                                       (VS+VDS) - -----------
A0551                                                                  -                TTF/4      -
A0552                                                                  ACS = ---------------------- + ADS
A0553                                                                              2/3(TTF/4)

0554  REF  87 LAST 881        22,2526  0 6112 0          TC      INTPRET
0555                          22,2527   41345 0          DLOAD   DMP
0556  REF   8 LAST 885        22,2530   02053 0                  TTF/4
0557  REF   1                 22,2531   05735 0                  2DPS2/3
0558                          22,2532   51715 0          PDVL    VSU*
0559  REF  17 LAST 884        22,2533   02111 1                  RS
0560  REF   2 LAST 884        22,2534   05572 1                  RDS,1
0561                          22,2535   70362 1          VSR1    V/SC
0562  REF   9 LAST 885        22,2536   02053 0                  TTF/4
0563                          22,2537   52715 0          PDVL    VAD*
0564  REF  16 LAST 884        22,2540   02117 1                  VS
0565  REF   2 LAST 884        22,2541   05600 1                  VDS,1
0566                          22,2542   70251 0          VSU     V/SC
0567                          22,2543   41053 1          VAD*    BOVB            BRANCH, SET ALARM, RETAIN GOOD ACS
0568  REF   2 LAST 884        22,2544   05564 0                  ADS,1
0569  REF   1                 22,2545   45061 1                  OVF2DPS1

0570                          22,2546   52206 1          PUSH    VSU             PUSH ACS UNTIL SEEN IF AFCS OVERFLOWS
0571  REF   4 LAST 883        22,2547   02133 1                  ASPRT
0572                          22,2550   77600 1          BOV                     BRANCH, SET ALARM, RETAIN GOOD AFCS
0573  REF   1                 22,2551   45057 1                  OVF2DPS2
A0574                                                                  -   -   -
0575  REF   2 LAST  37        22,2552   26147 1          STOVL   AFCS            AFCS = ACS-ASPRT
0576                          22,2553   77626 0          STADR
0577  REF   2 LAST  37        22,2554   75636 0          STORE   ACS             BEHOLD, UNWORTHY MORTAL
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L      SECOND DPS GUIDANCE                                                    USER'S OWN PAGE NO.  I6          S3  E4

 0578                              22,2555   63545 0  RETOVF12 DLOAD   DSQ
 0579  REF    6 LAST 882          22,2556   02107 0           RC
 0580                              22,2557   65205 0           DMP      PDDL
 0581  REF   10 LAST 885          22,2560   02053 0           TTF/4
 0582  REF    3 LAST 882          22,2561   02105 1           MAP2
 0583                              22,2562   64425 0           DSU      SR2R
 0584  REF    1                   22,2563   05610 0           MADP2
 0585                              22,2564   45471 1           DDV      STADR
 0586  REF    3 LAST 885          22,2565   75626 1           STORE    AFCS      +2     AFCS  = (MAP -MADP )/RC  TTF
A0587                                                                                      1     2     2
 0588                              22,2566   77604 0           BOVB                     RETAIN POSMAX ON OVERFLOW, BUT
 0589  REF    1                   22,2567   45066 0                    OVF2DPS3        BRANCH, SET ALARM, RETURN TO AFCCALC


R0590  ************************************************************************
R0591  THRUST ACCEL POINTING AND MAGNITUDE COMMANDS - DUE TO QUAD OR LINR GUID
R0592  ************************************************************************

 0593                              22,2570   41345 0  AFCCALC  DLOAD   DMP              COME HERE FROM LINGUID
 0594  REF    4 LAST 886          22,2571   02153 1           AFCS      +4
 0595  REF   18 LAST 885          22,2572   02111 1           RS
 0596                              22,2573   41325 0           PDDL     DMP            PUSH AFCL
 0597  REF    5 LAST 886          22,2574   02151 0           AFCS      +2                    2
 0598  REF    7 LAST 886          22,2575   02107 0           RC
 0599                              22,2576   55525 0           PDDL     VDEF           PUSH AFCL , FORM VECTOR AFCL
 0600  REF    6 LAST 886          22,2577   02147 1           AFCS                            1
 0601                              22,2600   76505 0           VXM      VSL1
 0602  REF    9 LAST 881          22,2601   02012 0           CLT/2                    -                                  *
 0603  REF    2 LAST  37          22,2602   02155 1           STORE    AFC            AFC = (AFCS , RC AFCS , RS  AFCS )CLT
 0604                              22,2603   77656 1           UNIT                          0          1   0     2
 0605  REF    3 LAST 875          22,2604   16167 0           STODL    UNAFC/2
 0606                              22,2605   00045 0                    36D            MAGNITUDE OF AFC, /AFC/
 0607  REF    4 LAST 875          22,2606   02163 1           STORE    /AFC/          FOR IGNITION ALGORITHM
 0608                              22,2607   77776 1           EXIT
 0609  REF    4 LAST 883          22,2610  51'401 0           INDEX    NDXBR
 0610  REF    1                   22,2611  1 0002 1           ICF      BRIGN2

 0611  REF    9 LAST 847          22,2612   54 111 1  -3       IS       OVFIND         RETURN FROM TTF/4 OVERFLOW
 0612  REF   16 LAST 559          22,2613   3 7766 1  -2       CA       FIVE           RETURN RESETTING COUNTFC
 0613  REF    3 LAST 875          22,2614  55'404 1  -1       IS       COUNTFC1       RETURN DECREMENTING COUNTFC
 0614  REF 135 LAST 885          22,2615   0 4161 0  RETIGN2  IC       PHASCHNG       RETURN (NORMAL) FROM IGNITN2
 0615                              22,2616    04022 0  +402     DCI      04022          PREVENT GOING FAR BACK IN 2DPS AFTR EXIT


R0616  ************************************************************************
R0617  PREPARE TO EXIT
R0618  ************************************************************************
```

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R0619 DOWNLINK ENTRIES

```
0620                          22,2617  0 0006 1          EXTEND
0621   REF  11 LAST 886       22,2620  4 1453 0          DCS     TTF/4
0622   REF 337 LAST 885       22,2621  52 145 0          DXCH    MPAC
0623   REF   1                22,2622  3 3720 1          CA      TSCALINV
0624   REF  10 LAST 884       22,2623  0 7357 1          TC      SHORTMP
0625                          22,2624  0 0004 0          INHINT
0626   REF 338 LAST 887       22,2625  52 145 0          DXCH    MPAC
0627   REF  11 LAST 762       22,2626  53'746 1          DXCH    TTGO
0628   REF   5 LAST 881       22,2627  3 1447 1          CA      TPIP      +1
0629   REF   1                22,2630  55'723 1          TS      DOWN2DPS
0630   REF  27 LAST 880       22,2631  3 1072 0          CA      AVGEXIT
0631   REF   2 LAST 887       22,2632  55'724 0          TS      DOWN2DPS +1
0632   REF   3 LAST 748       22,2633  3 5662 0          CA      EBANK7          MAKE UP A WORD WHICH MAY BE USED TO
06322  REF  63 LAST 868       22,2634  56 003 1          XCH     EBANK           FIND OUT WHERE THE DOWNLIST POINTER IS
06324  REF 245 LAST 868       22,2635  54 002 1          TS      Q               AT THE MOMENT.

06326  REF  13 LAST 333                    E7           EBANK=  TMINDEX

0633   REF  14 LAST 887       22,2636  3 1402 0          CA      TMINDEX
06332                         22,2637  0 0006 1          EXTEND
06334  REF  20 LAST 863       22,2640  7 7753 0          MP      BIT9            PUT LOW 6 BITS OF TMINDEX INTO BITS
06336  REF  14 LAST 339       22,2641  3 1401 0          CA      DNTMGOTO         14 - 9 OF L.
06338  REF  11 LAST 570       22,2642  7 4564 0          MASK    LOW8
0634   REF 159 LAST 868       22,2643  26 001 1          ADS     L               ADD LOW 8 BITS OF DNTMGOTO.
06342                         22,2644  0 0006 1          EXTEND
06344  REF  64 LAST 887       22,2645  22 003 1          DXCH    EBANK

06346  REF   5 LAST 875                    E4           EBANK=  E2DPS

0635   REF  12 LAST 850       22,2646  3 1320 1          CA      MASS
06352  REF   3 LAST 887       22,2647  53'726 1          DXCH    DOWN2DPS +2
06354  REF  88 LAST 885       22,2650  0 6112 0          TC      INTPRET
06356                         22,2651   77745 1          DLOAD
0636   REF   5 LAST 886       22,2652   02163 1                  /AFC/
0637   REF   4 LAST 887       22,2653   26330 0          STOVL   DOWN2DPS +4
0638   REF   4 LAST 886       22,2654   02167 0                  UNFC/2
0639   REF   5 LAST 887       22,2655   02332 1          STORE   DOWN2DPS +6
0640                          22,2656   77776 1          EXIT
0641                          22,2657  0 0003 1          RELINT

0642   REF   4 LAST 880       22,2660  25'402 0          INCR    FLPASSO         INCR FIRST PASS FLAG. REPEATS ARE OK.
0643   REF  28 LAST 887       22,2661  51'072 0          INDEX   AVGEXIT
0644   REF   1                22,2662  4 0005 0          CS      TTF/4CR
0645   REF  12 LAST 887       22,2663  6 1452 0          AD      TTF/4
0646                          22,2664  0 0006 1          EXTEND
0647   REF   5 LAST 886       22,2665  5 1401 0          INDEX   NDXBR
0648   REF   1                22,2666  6 0003 1          BZMF    BRXMID          CONTINUE PRESENT PHASE
```

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```
0649  REF  29 LAST 887    22,2667  3 1072 0          CA      AVGEXIT     PREPARE FOR NEW PHASE
0650  REF   2 LAST  36    22,2670  55'405 0          TS      AVGXTEMP    TEMPORARY PROTECTION FOR AVGEXIT
0651  REF 136 LAST 886    22,2671  0 4161 0          TC      PHASCHNG    PROTECT AVGEXIT
0652                      22,2672   04022 0  +402    OCT     04022
0653  REF   3 LAST 888    22,2673  3 1405 1          CA      AVGXTEMP
0654  REF  16 LAST 803    22,2674  6 7765 1          AD      SEVEN
0655  REF  30 LAST 888    22,2675  55'072 1          TS      AVGEXIT
0656  REF 256 LAST 883    22,2676  3 7767 0          CA      ZERO
0657  REF   5 LAST 887    22,2677  55'402 1          TS      FLPASSO     RESET FLAG INDICATING PASS ZERO (FIRST)
0658  REF   4 LAST 888    22,2700  51'405 1          INDEX   AVGXTEMP
0659  REF   1             22,2701  1 0006 0          TCF     BRXEND
```

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P0660   ************************************************************************
R0661   ROUTINES FOR EXITING FROM SECOND DPS GUIDANCE. THESE ARE:
R0662   ************************************************************************

R0663   1.      EXIGMID CALLS CALCRVG AS AN INTERPRETIVE SUBROUTINE UP UNTIL BUT NOT INCLUDING THE LAST PASS DURING
R0665           THE PREBURN PHASE. UPON RETURN EXIGMID RESTARTS 2DPS.

R0666   2.      EXIGEND IS USED ON THE LAST PASS DURING PREBURN. IT SETS UP FOR KALCMANU, FOR THE SUBSEQUENT 2DPS
R0668           BURN, AND EXITS TO THE MISSION CONTROL PROGRAM.

R0669   3.      EXGOLIN IS USED TO TERMINATE EACH PASS UP UNTIL BUT NOT INCLUDING THE LAST PASS ON ALL 2DPS BURN
R0671           PHASES. EXGOLIN OBTAINS ATTITUDE AND THROTTLE CONTROL AND TERMINATES THE JOB.

R0673   4.      EXFINAL IS THE FINAL 2DPS EXIT. IT SETS UP AND ISSUES THE ATTITUDE COMMAND FOR RANDOM THROTTLING
R0675           AND EXITS TO THE MISSION CONTROL PROGRAM.


R0676   EXIGMID SETS UP FOR CALCRVG TO MOVE STATE FORWARD A SPECIFIED TIME, INITIALIZES THE INTERPRETER, CALLS CALCRVG
R0678   AS AN INTERPRETIVE SUBROUTINE, AND UPON RETURN SETS UP FOR IGNALG AND BRANCHES INDIRECTLY THERETO.

 0680   REF   3 LAST 879     22,2702  0 3531 0  EXIGMID  IC      PRETINIT        INITIALIZES INTERPRETER FOR CALCRVG
A0681                                                                            SUCCEEDING CODING MUST NOT UNDO

 0682   REF  89 LAST 887     22,2703  0 6112 0           IC      INTPRET
 0683                        22,2704    43345 1          DLOAD   DAD
 0684   REF   1              22,2705    05727 0          PIGNALG
 0685   REF  13 LAST 879     22,2706    01307 1          PIPTIME
 0686   REF   2 LAST  36     22,2707    26045 1          STOVL   PIPTIMET        UPDATED PIPTIME TEMPORARY STORAGE
 0687   REF   4 LAST 875     22,2710    05722 0          ZEROPOS
 0688   REF   8 LAST 844     22,2711    34404 0          STCALL  DELV            DELV = 0
 0689   REF   2 LAST 821     22,2712    61137 0          CALCRVG                 STEPS FORWARD IN TIME LEAVING RN1, VN1
 0690                        22,2713    77776 1          EXIT

 0691   REF   1              22,2714  3 3705 0           CA      E2DPSL          ASSURE CORRECT EBANK BEFORE
 0692   REF  65 LAST 887     22,2715  54 003 0           IS      EBANK           DOING PHASCHNG
 0693   REF 137 LAST 888     22,2716  0 4161 0           IC      PHASCHNG        PROTECT PIPTIME. PREVENT REDOING CALCRVG
 0694                        22,2717   04022 0  +402     DCI     04022
 0695                        22,2720  0 0004 0  RNVNSTOR INHINT                  SET INHIBITED LOOP TO STORE FOR DWNLINK
 0696   REF   1              22,2721  3 3741 0           CA      NSCALR-1
 0697   REF  67 LAST 828     22,2722  54 070 1  RVSTOR   IS      RUPTREG1
 0698   REF  68 LAST 889     22,2723  50 070 0           INDEX   RUPTREG1
 0699   REF   3 LAST 843     22,2724  3 1050 0           CA      RN1
 0700   REF  69 LAST 889     22,2725  50 070 0           INDEX   RUPTREG1
 0701   REF  15 LAST 880     22,2726  55'010 0           IS      RN              STORE UPDATED RN, VN
 0702   REF  70 LAST 889     22,2727  10 070 1           CCS     RUPTREG1
 0703   REF   1              22,2730  1 2722 0           TCF     RVSTOR
 0704                        22,2731  0 0006 1           EXTEND
 0705   REF   3 LAST 889     22,2732  3 1445 0           DCA     PIPTIMET
 0706   REF  14 LAST 889     22,2733  53'307 0           DXCH    PIPTIME         UPDATED PIPTIME
```

L SECOND DPS GUIDANCE USER'S OWN PAGE NO. 20 S3 E4

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 0707                          22,2734  0 0006 1          EXTEND
 0708  REF  15 LAST 889       22,2735  3 1307 1          DCA     PIPTIME
 0709  REF   6 LAST 828       22,2736  53327 1           DXCH    STATIME          TIME FOR DWNLINK
 0710                          22,2737  0 0003 1          RELINT
 0711  REF  31 LAST 888       22,2740  0 1072 0          TC      AVGEXIT          RETURNS TO APPROPRIATE LOCATION IN 2DPS

R0712  EXIGEND EXTRAPOLATES UNAFC/2 TO TTF/4 = 0, SETS UP FOR MISSION CONTROL PROGRAM, SETS UP FOR THE SUCCEEDING
R0714  BRAKING PHASE, AND EXITS TO THE MISSION CONTROL PROGRAM.

R0715  EXTRAPOLATE UNAFC/2

R0716  UNAFC/2 = UNAFC/2+(UNAFC/2-UNAFC/20)(TTF)/(TPIPOLD-TPIP)

 0717                          22,2741  0 0006 1  EXIGEND  EXTEND
 0718  REF   4 LAST 881       22,2742  3 1451 0          DCA     TPIPOLD
 0719  REF 339 LAST 887       22,2743  52 145 0          DXCH    MPAC
 0720                          22,2744  0 0006 1          EXTEND
 0721  REF   6 LAST 887       22,2745  4 1447 0          DCS     TPIP
 0722  REF 340 LAST 890       22,2746  20 145 0          DAS     MPAC
 0723  REF   2 LAST 881       22,2747  3 7750 1          CA      TSCALE
 0724                          22,2750  0 0006 1          EXTEND
 0725  REF  23 LAST 809       22,2751  7 7761 1          MP      BIT3             MULTIPLIES BY N = 4 LEAVING RESULT IN L
 0726  REF 160 LAST 887       22,2752  3 0001 0          CA      L                ASSUMES N(TPIPOLD-TPIP)/4>TTF/4 IN MAGN.
 0727  REF   2 LAST 881       22,2753  0 7375 1          TC      DMPNSUB          N(TPIPOLD-TPIP)/4 TO MPAC, TTF UNITS
 0728                          22,2754  0 0006 1          EXTEND
 0729  REF  13 LAST 887       22,2755  3 1453 1          DCA     TTF/4
 0730  REF 341 LAST 890       22,2756  52 145 0          DXCH    MPAC             DIVIDEND TO MPAC
 0731  REF  62 LAST 868       22,2757  52 121 1          DXCH    BUF              DIVISOR TO BUF
 0732  REF   1                22,2760  0 5317 1          TC      USPRCADR
 0733  REF   1                22,2761   00352 0          CADR    DDV/BDDV         (TTF/4)/(N(TPIPOLD-TPIP)/4) TO MPAC

 0734  REF 257 LAST 888       22,2762  3 7767 0          CA      ZERO
 0735  REF   8 LAST 868       22,2763  54 153 1          TS      MODE             TO INDICATE DP IN MPAC

 0736  REF  90 LAST 889       22,2764  0 6112 0          TC      INTPRET
 0737                          22,2765  52315 1           PDVL    VSU
 0738  REF   5 LAST 887       22,2766  02167 0                   UNAFC/2
 0739  REF   3 LAST  37       22,2767  02175 0                   UNAFC/20
 0740                          22,2770  74352 0           VSL2    VXSC             VSL2 UNDOES MP BIT3 PRECEDING
 0741                          22,2771  77655 1           VAD
 0742  REF   6 LAST 890       22,2772  02167 0                   UNAFC/2          YIELDS EXTRAPOLATED UNAFC/2

R0743  SET UP FOR MISSION CONTROL PROGRAM

 0744  REF   4 LAST 729       22,2773  15656 0           STODL   POINTVSM         STORE FOR KALCMANU
 0745  REF  14 LAST 890       22,2774  02053 0                   TTF/4
 0746                          22,2775  41276 1           DCOMP   DMP
 0747  REF   2 LAST 887       22,2776  05721 0                   TSCALINV
 0748                          22,2777  77615 0           DAD
 0749  REF  16 LAST 890       22,3000  01307 1                   PIPTIME
```

L SECOND DPS GUIDANCE USER'S OWN PAGE NO. 21 S3 E4

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0750  REF   3 LAST 740     22,3001   02057 1          STORE   TULLG      TIME AT WHICH ULLAGE IS TO START
0751                       22,3002   77615 0          DAD
0752  REF   1              22,3003   05547 1                  PULLGCS
0753  REF  10 LAST 754     22,3004   02270 0          STORE   TIGN       DISPLAY TIGN FOR DOWNLINK.

R0754 SET UP FOR BRAKING PHASE

0755                       22,3005   77776 1          EXIT
0756  REF 138 LAST 889     22,3006  0 4161 0          IC      PHASCHNG   PROTECT TTF/4 AND PREVENT REREADING REG-
0757                       22,3007   04022 0  +402    DCT     04022      ISTERS REWRITTEN BY MISN CONT PROGRAM
0758                       22,3010  0 0006 1          EXTEND
0759  REF   8 LAST 881     22,3011  3 1455 1          DCA     TTF/4TMP
0760  REF  15 LAST 890     22,3012  53453 0           DXCH    TTF/4

R0761 RETURN TO MISSION CONTROL PROGRAM

0762  REF   4 LAST 889     22,3013  0 3531 0          IC      PRETINIT   INITIALIZES INTERPRETER
0763                       22,3014  0 0006 1          EXTEND
0764  REF   1              22,3015  3 3713 1          DCA     RETPREBL
0765                       22,3016  52 006 0          DTCB
```

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P0766   EXQDLIN STORES THE SEMI-UNIT VECTOR DEFINING THE DIRECTION OF COMMANDED THRUST ACCELERATION (UNAFC/2) IN THE
R0768   APPROPRIATE REGISTERS OF FINDCDUD (AXISD) AND CALLS FINDCDUD AND THROTCON AS SUBROUTINES.
R0770   FINALLY EXQDLIN TERMINATES THE JOB.

 0771   REF  10 LAST 886     22,3017  10 111 1  EXQDLIN  CCS     OVFIND      IF OVF AFTER COMPUTING AFCS1, ALARM, AND
 0772   REF   1              22,3020   1 3073 1           ICF     OVF2DPS4    DO NOT ISSUE ATTITUDE OR THROTTLE CMDS.
 0773                        22,3021   1 3023 1           ICF     +2
 0774   REF   2 LAST 892     22,3022   1 3073 1           ICF     OVF2DPS4    IN CASE OVFIND =-1

 0775   REF  91 LAST 890     22,3023   0 6112 0           IC      INTPRET
 0776                        22,3024   77775 1            VLOAD
 0777   REF   7 LAST 890     22,3025   02167 0                    UNAFC/2
 0778   REF   4 LAST 840     22,3026   36233 0            STCALL  AXISD
 0779   REF   3 LAST 734     22,3027   60703 0                    FINDCDUD    ATTITUDE CONTROL

 0780                        22,3030   74545 0            DLOAD   SR1R       LOAD GOOD /AFC/,
 0781   REF   6 LAST 887     22,3031   02163 1                    /AFC/       SCALE TO THROTCON UNITS,
 0782   REF   2 LAST 852     22,3032   01323 1            STORE   /ACF/       STORE IN THROTCON ACCEL CMD REGISTERS
 0783                        22,3033   77776 1            EXIT
 0784                        22,3034   0 0006 1           EXTEND
 0785   REF   1              22,3035   3 3717 0           DCA     THROTCOL
 0786                        22,3036   52 006 0           DTCB                THROTTLE CONTROL

 0787   REF  48 LAST 879     22,3037   0 4141 1  EXOVFLOW IC      2PHSCHNG    PREVENT RECALLING THROTCON AND FINDCDUD
 0788                        22,3040   00034 0            UCI     00034       4.35POT FOR ACCLJOB
 0789                        22,3041   00002 0  +002      UCI     00002       INACTIVATE GROUP 2

 0790   REF 103 LAST 870     22,3042   0 5567 0           IC      ENDOFJOB    TERMINATES THE JOB PERIODICALLY STARTED
A0791                                                                       BY A WAITLIST CALL FROM READACCS


R0792   EXFINAL IS THE FINAL EXIT FROM 2DPS. FIRST EXFINAL PLACES THE SEMI-UNIT NORMAL TO THE ORBITAL PLANE (CPT6/2)
R0794   IN AXISD AND CALLS FINDCDUD AS A SUBROUTINE. THIS CAUSES FURTHER THRUSTING TO BE NORMAL TO THE ORBITAL PLANE.
R0796   FINALLY EXFINAL RETURNS TO THE MISSION CONTROL PROGRAM WHICH EXECUTES THE RANDOM THROTTLING.

 0798   REF  92 LAST 892     22,3043   0 6112 0  EXFINAL  IC      INTPRET
 0799                        22,3044   77775 1            VLOAD
 0800   REF   7 LAST 882     22,3045   02357 1                    CPT6/2
 0801   REF   5 LAST 892     22,3046   36233 0            STCALL  AXISD
 0802   REF   4 LAST 892     22,3047   60703 0                    FINDCDUD    ATTITUDE CONTROL
 0803                        22,3050   77776 1            EXIT

 0804   REF 139 LAST 891     22,3051   0 4161 0           IC      PHASCHNG    PREVENT RECALLING FINDCDUD
 0805                        22,3052   04022 0  +402      UCI     04022

 0806   REF   5 LAST 891     22,3053   0 3531 0           IC      PRETINIT    INITIALIZES INTERPRETER
 0807                        22,3054   0 0006 1           EXTEND
 0808   REF   1              22,3055   3 3715 1           DCA     RETBURNL
 0809                        22,3056   52 006 0           DTCB
```

L SECOND DPS GUIDANCE USER'S OWN PAGE NO. 23 S3 E4

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P0810  ************************************************************************
R0811  SPECIAL PURPOSE SUBROUTINES OF SECOND DPS GUIDANCE
R0812  ************************************************************************

R0813  ************************************************************************
R0814  OVERFLOW ACTIONS
R0815  ************************************************************************

 0816                          22,3057   77775 1  OVF2DPS2 VLOAD                FROM PUSH LIST, PURPOSE: RESET POINTER
 0817                          22,3060   77776 1           EXIT

 0818  REF  42 LAST 824        22,3061   0 4755 1 OVF2DPS1 IC      ALARM        OVERFLOW PRIOR TO (PRESUMABLY DURING)
 0819                          22,3062    00410 1         OCT     00410        COMPUTATION OF ACS OR AFCS

 0820  REF  93 LAST 892        22,3063   0 6112 0          IC      INTPRET      OVFIND RESET BY BOVB OR BOV, NO REPEAT
 0821                          22,3064    77650 1         GOTO
 0822  REF   1                 22,3065    44555 1                 RETOVF12


 0823  REF  43 LAST 893        22,3066   0 4755 1 OVF2DPS3 IC      ALARM        DIVIDE OVERFLOW DURING COMPUTATION OF
 0824                          22,3067    00411 0         OCT     00411        AFCS . BOVB RESETS OVFIND.
A0825                                                                    1
 0826  REF  94 LAST 893        22,3070   0 6112 0          IC      INTPRET      SET ALARM AND RETURN
 0827                          22,3071    77650 1         GOTO
 0828  REF   1                 22,3072    44570 0                 AFCCALC


 0829  REF  11 LAST 892        22,3073   54 111 1 OVF2DPS4 IS      OVFIND       OVERFLOW AFTER COMPUTATION OF ACS, AFCS,
 0830  REF  44 LAST 893        22,3074   0 4755 1          IC      ALARM        AND AFCS . RESET OVFIND, SET ALARM, AND
 0831                          22,3075    00412 0         OCT     00412                  1
A0832                                                                                    RETURN SKIPPING CALLS OF FINDCDUD AND
 0833  REF   1                 22,3076   1 3037 1          ICF     EXOVFLOW     THRUTCON.
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L SECOND DPS GUIDANCE USER'S OWN PAGE NO. 24 S3 E4

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P0834   ************************************************************************
R0835   IGNITION ALGORITHM
R0836   ************************************************************************

R0837   IGNITN1 EXTRAPOLATES THE GIVEN STATE FORWARD THROUGH THE TIME INTERVAL REQUIRED TO ACCOMPLISH ULLAGE AND TO
R0839   LITE AT LOW THRUST AND TRIM THE ENGINE. THE EXTRAPOLATION ENDS AT THE TIME MAXIMUM THRUST WOULD BE COMMANDED
R0841   IF THE LITEUP PROCEDURE WERE INITIATED AT THE CURRENT GIVEN TIME. (THE GIVEN TIME IS NOT TRUE. ALL GIVEN
R0843   CONDITIONS INCLUDE A FREE-FALL EXTRAPOLATION OF THE ACTUAL ORBIT.) THE EXTRAPOLATION PERFORMED BY IGNITN1
R0845   INCLUDES ALL EFFECTS OF ENGINE THRUST DURING THE LITEUP PROCEDURE, AND IT USES THE
R0847   THRUST POINTING DIRECTION WHICH WILL BE COMMANDED AT THE INITIATION OF MAXIMUM THRUST.
R0849   THIS EXTRAPOLATED STATE IS THEN FED TO THE GUIDANCE EQUATIONS, WHICH COMPUTE THE THRUST POINTING
R0851   DIRECTION (UNAFC/2) AND THE THRUST ACCELERATION MAGNITUDE COMMAND (/AFC/).

R0853   IGNITN2 THEN RECEIVES THIS OUTPUT DATA FROM THE GUIDANCE EQUATIONS AND DETERMINES WHETHER THE THRUST
R0855   ACCELERATION MAGNITUDE COMMAND IS MONOTONICALLY INCREASING. WHEN IT IS, IGNITN2 USES THE PRESENT AND PREVIOUS
R0857   VALUES TO COMPUTE ONE QUARTER OF THE PRESENT TIME (TTF/4) RELATIVE TO THE TIME AT WHICH THE THRUST
R0859   ACCELERATION MAGNITUDE COMMAND WILL REACH THE CRITERION VALUE (/AFC/CR) WHICH CORRESPONDS TO MAXIMUM THROTTLE.
R0861   WHEN TTF/4 SO COMPUTED REACHES THE TIME CRITERION FOR TERMINATING THE PREBURN PHASE (TTF/4CR),
R0863   EXIGEND IS PROCESSED, TERMINATING THE PHASE AND RETURNING CONTROL TO THE MISSION CONTROL PROGRAM.
R0865   THE MISSION CONTROL PROGRAM EXECUTES THE COMPUTED IGNITION SEQUENCE. IGNITN2 MUST ALSO, ON EACH PASS,
R0867   REESTABLISH CERTAIN DATA REQUIRED FOR THE SUBSEQUENT PASS.

R0868   IGNITION ALGORITHM PART 1
R0869   ************************************************************************

R0870   DO TEMPORARY STORAGE

 0871   REF  95 LAST 893    22,3077  0 6112 0  IGNITN1  IC      INTPRET
 0872                       22,3100   77745 1            DLOAD
 0873   REF   7 LAST 892    22,3101   02163 1                   /AFC/
 0874   REF   2 LAST  37    22,3102   26165 1            STOVL  /AFC/OLD        OLD VALUE OF /AFC/ FOR USE BY IGNITN2

 0875   REF   8 LAST 892    22,3103   02167 0                   UNAFC/2
 0876   REF   4 LAST 890    22,3104   26175 0            STOVL  UNAFC/20        OLD VALUE OF UNAFC/2

R0877   EXTRAPOLATE STATE

 0878   REF   7 LAST 882    22,3105   02061 1                   R
 0879   REF   1             22,3106   24011 1            STOVL  RDUM
 0880   REF   5 LAST 882    22,3107   02067 1                   V
 0881   REF   1             22,3110   24017 1            STOVL  VDUM
 0882   REF   3 LAST 875    22,3111   02211 1                   GDOTM1
 0883   REF   1             22,3112   14025 0            STODL  JDUM
 0884   REF   1             22,3113   05545 0                   PFCULLG        ULLAGE PERIOD
 0885   REF   1             22,3114   14007 0            STODL  PDUM           DUMMY PERIOD
 0886   REF   1             22,3115   05551 0                   AFULLG         LEAVE AFULLG IN MPAC
 0887                       22,3116   77624 1            CALL                  EXTRAPOLATES DUMMY STATE AND
 0888   REF   1             22,3117   45255 1                   XTRIGN1        LEAVES INITIAL GRAVITY IN GDUM

 0889                       22,3120   77775 1            VLOAD
```

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```
0890   REF   1                 22,3121   00033 1                 GDUM
0891   REF   3 LAST  37        22,3122   16203 1          STODL  GDUMPRES        SAVE INITL GRAVITY FOR COMPUTING GDOTM1

0892   REF   1                 22,3123   05553 1                 PFCLITE        LITEUP PERIOD
0893   REF   2 LAST 894        22,3124   14007 0          STODL  PDUM
0894   REF   1                 22,3125   05555 1                 AFLITE         LEAVE AFLITE IN MPAC
0895                           22,3126   77624 1          CALL
0896   REF   2 LAST 894        22,3127   45255 1                 XTRIGN1        EXTRAPOLATE

0897                           22,3130   77745 1          DLOAD
0898   REF   1                 22,3131   05557 0                 PFCTRIM        TRIM PERIOD
0899   REF   3 LAST 895        22,3132   14007 0          STODL  PDUM
0900   REF   1                 22,3133   05561 0                 AFTRIM         LEAVE AFTRIM IN MPAC
0901                           22,3134   77624 1          CALL
0902   REF   3 LAST 895        22,3135   45255 1                 XTRIGN1        YIELDS FINAL EXTRAPOLATED STATE

0903                           22,3136   77775 1          VLOAD
0904   REF   2 LAST 894        22,3137   00011 1                 RDUM
0905   REF   1                 22,3140   26111 1          STOVL  RTEMP          RESTART PROTECTION FOR EXTRAPOLATED R
0906   REF   2 LAST 894        22,3141   00017 1                 VDUM
0907   REF   1                 22,3142   36117 0          STCALL VTEMP          RESTART PROTECTION FOR EXTRAPOLATED V

R0908  COMPUTE DERIVATIVE OF GRAVITY

0909   REF   1                 22,3143   45521 0                 GDUMCL         YIELDS FINAL GRAVITY IN MPAC AND GDUM
0910                           22,3144   70251 0          VSU    V/SC
0911   REF   4 LAST 895        22,3145   02203 1                 GDUMPRES
0912   REF   1                 22,3146   05537 0                 PPHM1          COMPLETES COMPUTATION OF DERIV OF G
0913   REF   1                 22,3147   02133 1          STORE  GDOTM1T        FOR USE NEXT PASS. RESTART PROTECTED.
0914                           22,3150   77776 1          EXIT

R0915  GENERATION OF EXTRAPOLATED DATA COMPLETE. PROTECT AND TRANSFER TO STORAGE.

0917   REF 140 LAST 892        22,3151   0 4161 0         IC     PHASCHNG       PROTECT R, V
0918                           22,3152   04022 0  +402    DCT    04022
0919   REF  96 LAST 894        22,3153   0 6112 0         IC     INTPRET
0920                           22,3154   77745 1          DLOAD
0921   REF   9 LAST 891        22,3155   02055 0                 TTF/4TMP
0922   REF  16 LAST 891        22,3156   26053 0          STOVL  TTF/4          RESTORES TTF/4 TO LAST VALUE BY GUIDANCE
0923   REF   2 LAST 895        22,3157   02111 1                 RTEMP
0924   REF   8 LAST 894        22,3160   26061 1          STOVL  R              EXTRAPOLATED R
0925   REF   2 LAST 895        22,3161   02117 1                 VTEMP
0926   REF   6 LAST 894        22,3162   26067 1          STOVL  V              EXTRAPOLATED V
0927   REF   2 LAST 895        22,3163   02133 1                 GDOTM1T
0928   REF   4 LAST 894        22,3164   02211 1          STORE  GDOTM1         DERIVATIVE OF G
0929                           22,3165   77776 1          EXIT
0930   REF   4 LAST 886        22,3166   3 1404 0         CA     COUNTFCT
0931   REF   2 LAST  36        22,3167   55,403 0         TS     COUNTFC        FOR IGNITN2
0932   REF   2 LAST 875        22,3170   0 3343 0         IC     XTRTPIP        YIELDS TPIP EXTRAPOLATED
0933   REF   3 LAST 878        22,3171   1 2210 1         TCF    RETIGN1
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L       SECOND DPS GUIDANCE                                          USER'S OWN PAGE NO.  26          S3  E4

R0934   IGNITION ALGORITHM PART 2
R0935   ************************************************************************

 0936                          22,3172  0 0006 1  IGNITN2  EXTEND
 0937   REF  17 LAST 895       22,3173  3 1453 1           DCA    TTF/4
 0938   REF  10 LAST 895       22,3174  53'455 0           DXCH   TTF/4TMP          SAVE TTF/4 FOR NEXT PASS
 0939   REF 141 LAST 895       22,3175  0 4161 0           IC     PHASCHNG          PROTECT TTF/4
 0940                          22,3176   04022 0  +402     OCT    04022
 0941   REF  50 LAST 881       22,3177  4 7743 1           CS     POSMAX
 0942   REF  18 LAST 896       22,3200  55'452 1           TS     TTF/4             PREVENT PREMATURE TERMINATION OF PREBURN

R0943   TEST WHETHER /AFC/ > /AFC/OLD. IF SO TEST WHETHER COUNTFC = 0.

 0944                          22,3201  0 0006 1           EXTEND
 0945   REF   8 LAST 894       22,3202  3 1563 0           DCA    /AFC/
 0946   REF 342 LAST 890       22,3203  52 145 0           DXCH   MPAC
 0947                          22,3204  0 0006 1           EXTEND
 0948   REF   3 LAST 894       22,3205  4 1565 1           DCS    /AFC/OLD
 0949   REF 343 LAST 896       22,3206  20 145 0           DAS    MPAC              /AFC/-/AFC/OLD IN MPAC

 0950   REF 344 LAST 896       22,3207  10 144 1           CCS    MPAC              TEST HI ORDER
 0951   REF   1                22,3210  1 3216 0           ICF    TCOUNTFC
 0952   REF   1                22,3211  1 3213 0           ICF    TSTLOAFC
 0953   REF   3 LAST 878       22,3212  1 2613 0           ICF    RETIGN2   -2    RESET COUNTFC
 0954   REF 345 LAST 896       22,3213  3 0145 1  TSTLOAFC CA     MPAC      +1    TEST LO ORDER
 0955                          22,3214  0 0006 1           EXTEND
 0956   REF   4 LAST 896       22,3215  6 2613 1           BZMF   RETIGN2   -2    RESET COUNTFC
 0957   REF   3 LAST 895       22,3216  11'403 0  TCOUNTFC CCS    COUNTFC
 0958   REF   5 LAST 896       22,3217  1 2614 1           ICF    RETIGN2   -1    DECREMENT COUNTFC

R0959   RESET TTF/4 BY EXTRAPOLATING /AFC/

R0960   TTF/4 = (1/4)(TPIPOLD-TPIP)(/AFC/-/AFC/CR)/(/AFC/OLD-/AFC/)

 0961                          22,3220  0 0006 1           EXTEND
 0962   REF   5 LAST 890       22,3221  3 1451 0           DCA    TPIPOLD
 0963   REF 346 LAST 896       22,3222  52 145 0           DXCH   MPAC
 0964                          22,3223  0 0006 1           EXTEND
 0965   REF   7 LAST 890       22,3224  4 1447 0           DCS    TPIP
 0966   REF 347 LAST 896       22,3225  20 145 0           DAS    MPAC
 0967   REF   3 LAST 890       22,3226  3 7750 1           CA     TSCALE
 0968   REF   3 LAST 890       22,3227  0 7375 1           IC     DMPNSUB           (1/4)(TPIPOLD-TPIP) TO MPAC, TTF UNITS

 0969                          22,3230  0 0006 1           EXTEND
 0970   REF   9 LAST 896       22,3231  3 1563 0           DCA    /AFC/
 0971   REF 348 LAST 896       22,3232  52 150 1           DXCH   MPAC      +3
 0972                          22,3233  0 0006 1           EXTEND
 0973   REF   1                22,3234  4 3543 1           DCS    /AFC/CR
 0974   REF 349 LAST 896       22,3235  20 150 1           DAS    MPAC      +3
 0975   REF  10 LAST 850       22,3236  0 7155 1           IC     DMP
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0976  REF 350 LAST 896     22,3237   00147 0          GENADR MPAC     +3

0977                       22,3240   0 0006 1         EXTEND
0978  REF   4 LAST 896     22,3241   3 1565 0         DCA    /AFC/OLD
0979  REF  63 LAST 890     22,3242   52 121 1         DXCH   BUF
0980                       22,3243   0 0006 1         EXTEND
0981  REF  10 LAST 896     22,3244   4 1563 1         DCS    /AFC/
0982  REF  64 LAST 897     22,3245   20 121 1         DAS    BUF
0983  REF   2 LAST 890     22,3246   0 5317 1         IC     USPRCADR
0984  REF   2 LAST 890     22,3247    00352 0         CADR   DDV/BDDV        YIELDS TTF/4 IN MPAC

0985  REF  12 LAST 893     22,3250   10 111 1         CCS    OVFIND
0986  REF   6 LAST 896     22,3251   1 2612 1         TCF    RETIGN2  -3     IF TTF/4 OVFL, RESETS OVFIND, COUNTPC.

0987  REF 351 LAST 897     22,3252   52 145 0         DXCH   MPAC
0988  REF  19 LAST 896     22,3253   53'453 0         DXCH   TTF/4
0989  REF   7 LAST 897     22,3254   1 2615 0         TCF    RETIGN2


R0990  ************************************************************************
R0991  SPECIAL PURPOSE STATE EXTRAPOLATION SUBROUTINE FOR IGNITN1
R0992  ************************************************************************

R0993  XTRIGN1 RECEIVES THE EXTRAPOLATION PERIOD IN PDUM; THE INITIAL STATE IN RDUM, VDUM; THE THRUST ACCELERATION
R0995  MAGNITUDE IN MPAC, DIRECTION IN UNAFC/2; AND JERK IN JDUM.

R0996  IT LEAVES GRAVITY IN GDUM, THE TOTAL INITIAL ACCELERATION IN ADUM, AND THE EXTRAPOLATED STATE IN RDUM, VDUM.

R0998  PRESENTLY THE DUM REGISTERS OCCUPY LOCATIONS FIXLOC +6 THRU FIXLOC +45 OCTAL.

1000                       22,3255   77620 0  XTRIGN1  STQ
1001  REF   2 LAST  36     22,3256   02007 1           RETXIGN1        SAVE QPRET
1002                       22,3257   74352 0           SL1     VXSC
1003  REF   9 LAST 894     22,3260   02167 0           UNAFC/2
1004                       22,3261   45006 0           PUSH    CALL    PUSHES AF UNAFC
1005  REF   2 LAST 895     22,3262   45521 0           GDUMCL          YIELDS GRAVITY IN MPAC AND GDUM
1006                       22,3263   45455 1           VAD     STADR
1007  REF   1              22,3264   77736 0           STORE   ADUM     ADUM = AF UNAFC+G
1008                       22,3265   77624 1           CALL
1009  REF   1              22,3266   45471 1                   XTRDUMST        EXTRAPOLATES RDUM, VDUM
1010                       22,3267   77650 1           GOTO
1011  REF   3 LAST 897     22,3270   02007 1                   RETXIGN1
```

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```
P1012   ************************************************************************
R1013   LINEAR GUIDANCE - SPHERICAL ACCELERATION AS LINEAR TIME FUNCTION
R1014   ************************************************************************

R1015   SET LINEAR GUIDANCE COEFFICIENTS IN EVEN NUMBERED PHASES
R1016   ************************************************************************

 1017   REF   2 LAST 880     22,3271  0 2140 0  LSETEVN  TC      NTLZPASS
 1018   REF  97 LAST 895     22,3272  0 6112 0            TC      INTPRET
 1019                        22,3273   77773 1            VLOAD*
 1020   REF   3 LAST 885     22,3274   05564 0                    ADS,1          -       -
 1021   REF   1              22,3275   16175 0            STODL   ADLINS         ADLINS = ADS, ADLINS  = ASPRT  SUCH THAT
 1022   REF   5 LAST 885     22,3276   02135 1                    ASPRT    +2                    1       1
 1023   REF   2 LAST 898     22,3277   02177 1            STORE   ADLINS   +2    THE TARGET IS ZERO ANGULAR MOMNTUM RATE
 1024                        22,3300   40015 1            DAD     BOV
 1025   REF   7 LAST 886     22,3301   02151 0                    AFCS     +2
 1026   REF   1              22,3302   45307 1                    LSEOVF
 1027   REF   3 LAST 885     22,3303   26143 0  LSENOVF   STOVL   ACS      +2    ACS  = ASPRT +AFCS
 1028   REF   3 LAST 898     22,3304   02175 0                    ADLINS               1       1     1
 1029                        22,3305   77650 1            GOTO
 1030   REF   1              22,3306   45317 0                    LINSET

 1031                        22,3307   52034 1  LSEOVF    RTB     GOTO           PLACE SIGNED POSMAX INTO MPAC & RETURN.
 1032   REF  16 LAST 767     22,3310   73501 1                    SIGNMPAC
 1033   REF   1              22,3311   45303 0                    LSENOVF

R1034   SET LINEAR GUIDANCE COEFFICIENTS IN ODD NUMBERED PHASES
R1035   ************************************************************************

 1036   REF   3 LAST 898     22,3312  0 2140 0  LSETODD  TC      NTLZPASS
 1037   REF  98 LAST 898     22,3313  0 6112 0            TC      INTPRET
 1038                        22,3314   77773 1            VLOAD*
 1039   REF   4 LAST 898     22,3315   05564 0                    ADS,1          -       -
 1040   REF   4 LAST 898     22,3316   02175 0            STORE   ADLINS         ADLINS = ADS

R1041   COMMON PARTS OF LSETEVN AND LSETODD
R1042   ************************************************************************

 1043                        22,3317   77645 0  LINSET   BVSU
 1044   REF   4 LAST 898     22,3320   02141 1                    ACS            -       -     -
 1045   REF   1              22,3321   16203 1            STODL   ADELLINS       ADELLINS = ACS-ADLINS
 1046   REF  20 LAST 897     22,3322   02053 0                    TTF/4
 1047   REF   1              22,3323   02211 1            STORE   TTFLIN/4
 1048                        22,3324   77776 1            EXIT
 1049   REF   6 LAST 880     22,3325  1 2235 0            TCF     TTFINCR  +1

R1050   LINEAR GUIDANCE EQUATIONS
R1051   ************************************************************************

 1052   REF  99 LAST 898     22,3326  0 6112 0  LINGUID  TC      INTPRET
```

L SECOND DPS GUIDANCE USER'S OWN PAGE NO. 29 S3 E4

```
1053                          22,3327   56345 0          DLOAD   DDV
1054   REF  21 LAST 898      22,3330   02053 0                  TTF/4
1055   REF   2 LAST 898      22,3331   02211 1                  TTFLIN/4
1056                          22,3332   53361 0          VXSC    VAD
1057   REF   2 LAST 898      22,3333   02203 1                  ADELLINS
1058   REF   5 LAST 898      22,3334   02175 0                  ADLINS
1059   REF   5 LAST 898      22,3335   02141 1          STORE   ACS             FOR USE BY LINSET FOR FAZES 6 AND 9
1060                          22,3336   77651 0          VSU
1061   REF   6 LAST 898      22,3337   02133 1                  ASPRT           -       -       -       -
1062   REF   8 LAST 898      22,3340   02147 1          STORE   AFCS            AFCS = TTF ADELLINS/TTFLIN+ADLINS-ASPRT
1063                          22,3341   77650 1          GOTO
1064   REF   2 LAST 893      22,3342   44570 0                  AFCCALC


R1065  ************************************************************************
R1066  SUBROUTINE TO SET TPIP EXTRAPOLATED
R1067  ************************************************************************

1068                          22,3343   0 0006 1  XTRTPIP  EXTEND
1069   REF  17 LAST 890       22,3344   3 1307 1           DCA     PIPTIME
1070   REF   8 LAST 896       22,3345   53'447 0           DXCH    TPIP
1071                          22,3346   0 0006 1           EXTEND
1072   REF   1                22,3347   3 3541 1           DCA     PPHMICS
1073   REF   9 LAST 899       22,3350   21'447 0           DAS     TPIP
1074   REF 246 LAST 887       22,3351   0 0002 0           TC      Q
```

```
P1075   ************************************************************************
R1076   GENERAL PURPOSE SUBROUTINES CONTRIBUTED BY SECOND DPS GUIDANCE
R1077   ************************************************************************

R1078   ************************************************************************
R1079   DOUBLE PRECISION ROOT FINDER SUBROUTINE
R1080   ************************************************************************

R1081
R1082           ROOTPSRS FINDS ONE ROOT OF THE POWER SERIES A X^N + A X^(N-1) + ... + A X + A
R1084                                                        N     N-1           1     0

R1086   USING NEWTON'S METHOD STARTING WITH AN INITIAL GUESS FOR THE ROOT. THE ENTERING DATA MUST BE AS FOLLOWS:

A1088                                   A       SP      LOC-3           ADRES FOR REFERENCING PWR COF TABL
A1089                                   L       SP      N-1             N IS THE DEGREE OF THE POWER SERIES
A1090                                   MPAC    DP      X               INITIAL GUESS FOR ROOT

A1091                                   LOC-2N  DP      A(0)
A1092                                           ...
A1093                                   LOC     DP      A(N)
A1094                                   LOC+2   SP      PRECROOT        PREC RQD OF ROOT (AS FRACT OF 1ST GUESS)

R1095   THE DP RESULT IS LEFT IN MPAC UPON EXIT, AND A SP COUNT OF THE ITERATIONS TO CONVERGENCE IS LEFT IN MPAC+2.
R1097   RETURN IS TO LOC(TC POWRSERS)+1.

R1098           PRECAUTION: ROOTPSRS MAKES NO CHECKS FOR OVERFLOW OR FOR IMPROPER USAGE. IMPROPER USAGE COULD
R1100   PRECLUDE CONVERGENCE OR REQUIRE EXCESSIVE ITERATIONS. AS A SPECIFIC EXAMPLE, ROOTPSRS FORMS A DERIVATIVE
R1102   COEFFICIENT TABLE BY MULTIPLYING EACH A(I) BY I, WHERE I RANGES FROM 1 TO N. IF AN ELEMENT OF THE DERIVATIVE
R1104   COEFFICIENT TABLE = 1 OR > 1 IN MAGNITUDE, ONLY THE EXCESS IS RETAINED. ROOTPSRS MAY CONVERGE ON THE CORRECT
R1106   ROOT NONETHELESS, BUT IT MAY TAKE AN EXCESSIVE NUMBER OF ITERATIONS. THEREFORE THE USER SHOULD RECOGNIZE:

R1108   1. USER'S RESPONSIBILITY TO ASSURE THAT I X A(I) < 1 IN MAGNITUDE FOR ALL I.

R1110   2. USER'S RESPONSIBILITY TO ASSURE OVERFLOW WILL NOT OCCUR IN EVALUATING EITHER THE RESIDUAL OR THE DERIVATIVE
R1112      POWER SERIES. THIS OVERFLOW WOULD BE PRODUCED BY SUBROUTINE POWRSERS, CALLED BY ROOTPSRS, AND MIGHT NOT
R1114      PRECLUDE EVENTUAL CONVERGENCE.

R1115   3. AT PRESENT, ERASABLE LOCATIONS ARE RESERVED ONLY FOR N UP TO 5. AN N IN EXCESS OF 5 WILL PRODUCE CHAOS.
R1117      ALL ERASABLES USED BY ROOTPSRS ARE UNSWITCHED LOCATED IN THE REGION FROM MPAC-33 OCT TO MPAC+7.

R1119   4. THE ITERATION COUNT RETURNED IN MPAC+2 MAY BE USED TO DETECT ABNORMAL PERFORMANCE.

A1121                                                                   STORE ENTERING DATA, INITLIZE ERASABLES

 1122                    22,3352  0 0006 1  ROOTPSRS EXTEND
 1123   REF   1          22,3353  22 122 0          DXCH    RETROOT       RETURN ADRES
 1124   REF   1          22,3354  54 107 0          IS      PWRPTR        PWR TABL POINTER
 1125   REF 352 LAST 897 22,3355  52 150 1          DXCH    MPAC     +3   PWR TABL ADRES, N-1
 1126   REF   1          22,3356  3 3470 1          CA      DERTABLL
```

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L       SECOND DPS GUIDANCE                                                     USER'S OWN PAGE NO.  31          S3  E4

1127    REF   1                 22,3357  54 131 0            IS    DERPTR          DER TABL POINTER
1128    REF 353 LAST 900        22,3360  54 151 0            IS    MPAC     +5     DER TABL ADRES
1129    REF 354 LAST 901        22,3361  10 150 1            CCS   MPAC     +4     NO POWER SERIES OF DEGREE 1 OR LESS
1130    REF 355 LAST 901        22,3362  54 152 0            IS    MPAC     +6     N-2
1131    REF 258 LAST 890        22,3363  3 7767 0            CA    ZERO            MODE USED AS ITERATION COUNTER, MODE
1132    REF   9 LAST 890        22,3364  54 153 1            IS    MODE            MUST BE POS SO ABS WON'T COMP MPAC+3 ETC

A1133                                                                           COMPUTE CRITERION TO STOP ITERATING

1134                            22,3365  0 0006 1            EXTEND
1135    REF 356 LAST 901        22,3366  3 0145 1            DCA   MPAC            FETCH ROOT GUESS, KEEPING IT IN MPAC
1136    REF   1                 22,3367  52 117 1            DXCH  ROOTPS          AND IN ROOTPS
1137    REF 357 LAST 901        22,3370  50 147 0            INDEX MPAC     +3     PWR TABL ADRES
1138                            22,3371  3 0005 1            CA    5               PRECROOT TO A
1139    REF  11 LAST 887        22,3372  0 7357 1            TC    SHORTMP         YIELDS DP PRODUCT IN MPAC
1140    REF   3 LAST 897        22,3373  0 5317 1            TC    USPRCADR
1141    REF   1                 22,3374   01206 1            CADR  ABS             YIELDS ABVAL OF CRITERION ON DX IN MPAC
1142    REF 358 LAST 901        22,3375  52 145 0            DXCH  MPAC
1143    REF   1                 22,3376  52 115 0            DXCH  DXCRIT          CRITERION

A1144                                                                           SET UP DER COF TABL

1145                            22,3377  0 0006 1            EXTEND
1146    REF   2 LAST 900        22,3400  5 0107 1            INDEX PWRPTR
1147                            22,3401  3 0004 0            DCA   3
1148    REF 359 LAST 901        22,3402  52 145 0            DXCH  MPAC            A(N) TO MPAC

1149    REF 360 LAST 901        22,3403  3 0150 0            CA    MPAC     +4     N-1 TO A

1150    REF   1                 22,3404  54 130 1  DERCLOOP  IS    PWRCNT          LOOP COUNTER
1151    REF 160 LAST 866        22,3405  6 7763 1            AD    ONE
1152    REF   4 LAST 896        22,3406  0 7375 1            TC    DMPNSUB         YIELDS DERCOF = I X A(I) IN MPAC
1153                            22,3407  0 0006 1            EXTEND
1154    REF   3 LAST 901        22,3410  5 0107 1            INDEX PWRPTR
1155                            22,3411  3 0002 0            DCA   1
1156    REF 361 LAST 901        22,3412  52 145 0            DXCH  MPAC            A(I-1) TO MPAC, FETCHING DERCOF
1157    REF   2 LAST 901        22,3413  50 131 1            INDEX DERPTR
1158                            22,3414  52 004 1            DXCH  3               DERCOF TO DER TABL
1159    REF  95 LAST 864        22,3415  4 7762 1            CS    TWO
1160    REF   4 LAST 901        22,3416  26 107 0            ADS   PWRPTR          DECREMENT PWR POINTER
1161    REF  96 LAST 901        22,3417  4 7762 1            CS    TWO
1162    REF   3 LAST 901        22,3420  26 131 0            ADS   DERPTR          DECREMENT DER POINTER
1163    REF   2 LAST 901        22,3421  10 130 1            CCS   PWRCNT
1164    REF   1                 22,3422  1 3404 0            TCF   DERCLOOP

A1165                                                                           CONVERGE ON ROOT

1166                            22,3423  0 0006 1  ROOTLOOP  EXTEND
1167    REF   2 LAST 901        22,3424  3 0117 0            DCA   ROOTPS          FETCH CURRENT ROOT
1168    REF 362 LAST 901        22,3425  52 145 0            DXCH  MPAC            LEAVE IN MPAC
```

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```
1169                                22,3426  0 0006 1           EXTEND
1170   REF 363 LAST 901             22,3427  3 0152 1           DCA     MPAC      +5     LOAD A, L WITH DER TABL ADRES, N-2
1171   REF   1                      22,3430  0 7267 0           IC      POWRSERS         YIELDS DERIVATIVE IN MPAC

1172                                22,3431  0 0006 1           EXTEND
1173   REF   3 LAST 901             22,3432  3 0117 0           DCA     ROOTPS
1174   REF 364 LAST 902             22,3433  52 145 0           DXCH    MPAC             CURRENT ROOT TO MPAC, FETCHING DERIVTIVE
1175   REF  65 LAST 897             22,3434  52 121 1           DXCH    BUF              LEAVE DERIVATIVE IN BUF AS DIVISOR
1176                                22,3435  0 0006 1           EXTEND
1177   REF 365 LAST 902             22,3436  3 0150 0           DCA     MPAC      +3     LOAD A, L WITH PWR TABL ADRES, N-1
1178   REF   2 LAST 902             22,3437  0 7267 0           IC      POWRSERS         YIELDS RESIDUAL IN MPAC

1179   REF   4 LAST 901             22,3440  0 5317 1           IC      USPRCADR
1180   REF   3 LAST 897             22,3441   00352 0           CADR    DDV/BDDV         YIELDS -DX IN MPAC

1181                                22,3442  0 0006 1           EXTEND
1182   REF 366 LAST 902             22,3443  4 0145 0           DCS     MPAC             FETCH DX, LEAVING -DX IN MPAC
1183   REF   4 LAST 902             22,3444  20 117 1           DAS     ROOTPS           CORRECTED ROOT NOW IN ROOTPS

1184   REF   5 LAST 902             22,3445  0 5317 1           IC      USPRCADR
1185   REF   2 LAST 901             22,3446   01206 1           CADR    ABS              YIELDS ABS(DX) IN MPAC
1186                                22,3447  0 0006 1           EXTEND
1187   REF   2 LAST 901             22,3450  4 0115 0           DCS     DXCRIT
1188   REF 367 LAST 902             22,3451  20 145 0           DAS     MPAC             ABS(DX)-ABS(DXCRIT) IN MPAC

1189   REF  10 LAST 901             22,3452  24 153 0           INCR    MODE             INCREMENT ITERATION COUNTER

1190   REF 368 LAST 902             22,3453  10 144 1           CCS     MPAC             TEST HI ORDER DX
1191   REF   1                      22,3454  1 3423 0           TCF     ROOTLOOP
1192   REF   1                      22,3455  1 3457 0           TCF     TESTLODX
1193   REF   1                      22,3456  1 3463 1           TCF     ROOTSTOR
1194   REF 369 LAST 902             22,3457  10 145 0  TESTLODX CCS     MPAC      +1     TEST LO ORDER DX
1195   REF   2 LAST 902             22,3460  1 3423 0           TCF     ROOTLOOP
1196   REF   2 LAST 902             22,3461  1 3463 1           TCF     ROOTSTOR
1197   REF   3 LAST 902             22,3462  1 3463 1           TCF     ROOTSTOR
1198   REF   5 LAST 902             22,3463  52 117 1  ROOTSTOR DXCH    ROOTPS
1199   REF 370 LAST 902             22,3464  52 145 0           DXCH    MPAC             STORE DP ROOT IN MPAC, MPAC+1
1200   REF  11 LAST 902             22,3465  3 0153 0           CA      MODE
1201   REF 371 LAST 902             22,3466  54 146 0           TS      MPAC      +2     STORE SP ITERATION COUNT IN MPAC+2
1202   REF   2 LAST 900             22,3467  0 0122 0           IC      RETROOT

1203   REF   1                      22,3470   00137 1  DERTABLL ADRES   DERCOFN   -3
```

```
P1204   ************************************************************************
R1205   GENERAL PURPOSE SUBROUTINE FOR EXTRAPOLATING DUMMY STATE RDUM, VDUM
R1206   ************************************************************************

R1207   XTRDUMST REQUIRES THE EXTRAPOLATION PERIOD, INITIAL POSITION, INITIAL VELOCITY, INITIAL ACCELERATION, JERK
R1209   TO ARRIVE IN PDUM, RDUM, VDUM, ADUM, JDUM.

R1210   IT LEAVES THE EXTRAPOLATED STATE IN RDUM, VDUM.

R1211   PRESENTLY THE DUM REGISTERS ARE LOCATIONS FIXLOC +6 THRU FIXLOC +31 OCTAL, AND FIXLOC +40 OCTAL THRU
R1213   FIXLOC +45 OCTAL.

R1214                                                    2          3
R1215   THE EQNS ARE RDUM = RDUM+VDUM PDUM+ADUM PDUM /2+JDUM PDUM /6,
R1216                                                    2
R1217                 VDUM = VDUM+ADUM PDUM+JDUM PDUM /2.

R1218   THEY ARE PROGRAMMED AS RDUM = ((JDUM PDUM/3+ADUM)PDUM/2+VDUM)PDUM+RDUM

R1219                          VDUM = (JDUM PDUM/2+ADUM)PDUM+VDUM

 1220                        22,3471   77745 1  XTRDUMST DLOAD
 1221  REF   4 LAST 895     22,3472   00007 0           PDUM
 1222                        22,3473   74205 0           DMP     VXSC
 1223  REF   1              22,3474   05731 1           1/3DP
 1224  REF   2 LAST 894     22,3475   00025 0           JDUM
 1225                        22,3476   74255 0           VAD     VXSC
 1226  REF   2 LAST 897     22,3477   00041 1           ADUM
 1227  REF   5 LAST 903     22,3500   00007 0           PDUM
 1228                        22,3501   53362 0           VSR1    VAD
 1229  REF   3 LAST 895     22,3502   00017 1           VDUM
 1230                        22,3503   53361 0           VXSC    VAD
 1231  REF   6 LAST 903     22,3504   00007 0           PDUM
 1232  REF   3 LAST 895     22,3505   00011 1           RDUM
 1233  REF   4 LAST 903     22,3506   14011 1           STODL   RDUM          EXTRAPOLATED RDUM, NO RESTART PROTECTION

 1234  REF   7 LAST 903     22,3507   00007 0           PDUM
 1235                        22,3510   74362 0           SR1R    VXSC
 1236  REF   3 LAST 903     22,3511   00025 0           JDUM
 1237                        22,3512   74255 0           VAD     VXSC
 1238  REF   3 LAST 903     22,3513   00041 1           ADUM
 1239  REF   8 LAST 903     22,3514   00007 0           PDUM
 1240                        22,3515   77655 1           VAD
 1241  REF   4 LAST 903     22,3516   00017 1           VDUM
 1242  REF   5 LAST 903     22,3517   00017 1           STORE   VDUM          EXTRAPOLATED VDUM, NO RESTART PROTECTION
 1243                        22,3520   77616 0           RVQ
```

```
P1244   ************************************************************************
R1245   DUMMY GRAVITY SUBROUTINE
R1246   ************************************************************************

R1247   GDUMCL COMPUTES GRAVITY GIVEN POSITION IN RDUM, LEAVING RESULT IN MPAC AND GDUM.

R1249                                          2
R1250   GDUM =-MUEARTH UNIT(RDUM)/(ABVAL(RDUM))

 1251                        22,3521   57575 1  GDUMCL   VLOAD   VCOMP
 1252   REF   5 LAST 903     22,3522   00011 1           RDUM
 1253                        22,3523   74256 0           UNIT    VXSC
 1254   REF   2 LAST 883     22,3524   21203 0           MUEARTH
 1255                        22,3525   76541 0           V/SC    VSL1        SHIFT COMPENSATES FOR SEMI-UNIT
 1256                        22,3526   00043 0           42
 1257   REF   2 LAST 895     22,3527   00033 1           STORE   GDUM
 1258                        22,3530   77616 0           RVQ


R1259   ************************************************************************
R1260   INTERPRETER INITIALIZATION SUBROUTINE
R1261   ************************************************************************

 1262   REF  32 LAST 879     22,3531  3 0110 1  PRETINIT CA      FIXLOC
 1263   REF   1              22,3532  54 156 1           TS      PUSHLOC
 1264   REF 259 LAST 901     22,3533  3 7767 0           CA      ZERO
 1265   REF  13 LAST 897     22,3534  54 111 1           TS      OVFIND
 1266   REF 247 LAST 899     22,3535  0 0002 0           TC      Q
```

```
P1267   ************************************************************************
R1268   SECOND DPS TARGET PARAMETERS
R1269   ************************************************************************

R1270   PARAMETER TABLE INDIRECT ADDRESSES

 1271   REF   1                    22,3562  TTF/4NU  =      TTF/4NOX
 1272   REF   1                    22,3563  ADS      =      AOXS
 1273   REF   1                    22,3571  RDS      =      ROXS
 1274   REF   1                    22,3577  VDS      =      VOXS
 1275   REF   1                    22,3605  JDS2     =      JOXS2
 1276   REF   1                    22,3607  MADP2    =      MAOXP2
R1277
R1278   A CONSISTENT SET OF UNITS IS USED THROUOUT THE SECOND DPS GUIDANCE. THESE UNITS ARE:
R1280   TIME 2( 15)CS; LENGTH 2( 24)M; ANGLE 2(  0)RAD.

R1281   IGNITION ALGORITHM - PREBURN PARAMETERS
R1282   ************************************************************************

 1283                  22,3536   03213 1  PPHMI    2DEC*  +3.350000000 E + 3 B - 15 *
C1283                  22,3537   00000 1
 1284                  22,3540   00000 1  PPHM1CS  2DEC*  +3.350000000 E + 3 B - 28 *
C1284                  22,3541   06426 1
 1285                  22,3542   00513 0  /AFC/CR  2DEC*  +3.159982925 E - 4 B +  6 *
C1285                  22,3543   13111 1
 1286                  22,3544   00567 0  PFCULLG  2DEC*  +7.500000000 E + 2 B - 15 *
C1286                  22,3545   00000 1
 1287                  22,3546   00000 1  PULLGCS  2DEC*  +7.500000000 E + 2 B - 28 *
C1287                  22,3547   01356 0
 1288                  22,3550   00015 0  AFULLG   2DEC*  +1.276510908 E - 5 B +  6 *
C1288                  22,3551   14247 0
 1289                  22,3552   00226 1  PFCLITE  2DEC*  +3.000000000 E + 2 B - 15 *
C1289                  22,3553   00000 1
 1290                  22,3554   00047 1  AFLITE   2DEC*  +3.781860583 E - 5 B +  6 *
C1290                  22,3555   24767 1
 1291                  22,3556   02176 0  PFCTRIM  2DEC*  +2.300000000 E + 3 B - 15 *
C1291                  22,3557   00000 1
 1292                  22,3560   00047 1  AFTRIM   2DEC*  +3.788401593 E - 5 B +  6 *
C1292                  22,3561   27132 1
```

L SECOND DPS GUIDANCE USER'S OWN PAGE NO. 36 S3 E4

```
P1293   PARAMETER TABLE FOR BURN PHASES
R1294   ************************************************************.

 1295                    22,3562   67637 1  TTF/4NOX 2DEC*   -8.383250000 E + 3 B - 15 *

 1296                    22,3563   77753 0  AOXS     2DEC*   -1.994161737 E - 5 B +  6 *
C1296                    22,3564   42675 0
 1297                    22,3565   00000 1           2DEC    0
C1297                    22,3566   00000 1
 1298                    22,3567   02365 0           2DEC*   +7.216471076 E -11 B + 30 *
C1298                    22,3570   21076 0
 1299                    22,3571   14605 1  ROXS     2DEC*   +6.689950238 E + 6 B - 24 *
C1299                    22,3572   04744 1
 1300                    22,3573   00000 1           2DEC    0
C1300                    22,3574   00000 1
 1301                    22,3575   00415 1           2DEC*   +1.646802361 E - 2 B -  0 *
C1301                    22,3576   31771 1
 1302                    22,3577   77766 0  VOXS     2DEC*   -2.825570521 E - 1 B -  9 *
C1302                    22,3600   76522 0
 1303                    22,3601   00000 1           2DEC    0
C1303                    22,3602   00000 1
 1304                    22,3603   76663 0           2DEC*   -1.095743551 E - 6 B + 15 *
C1304                    22,3604   67211 1
 1305                    22,3605   01513 1  JOXS2    2DEC*   +1.463228058 E -15 B + 45 *
C1305                    22,3606   17626 0
 1306                    22,3607   01731 0  MAOXP2   2DEC*   +5.167109434 E + 8 B - 33 *
C1306                    22,3610   21421 0
```

L SECOND DPS GUIDANCE USER'S OWN PAGE NO. 37 S3 E4

```
 1307                 22,3611   75043 1  TTF/4NOF DEC*   -3.000000000 E + 3 B - 15 *

 1308                 22,3612   00007 0  AOFS     2DEC*  +6.921710813 E - 6 B +  6 *
C1308                 22,3613   10202 0
 1309                 22,3614   00000 1           2DEC   0
C1309                 22,3615   00000 1
 1310                 22,3616   01412 1           2DEC*  +4.422776218 E -11 B + 30 *
C1310                 22,3617   02011 0
 1311                 22,3620   14602 0  ROFS     2DEC*  +6.686947349 E + 6 B - 24 *
C1311                 22,3621   07066 0
 1312                 22,3622   00000 1           2DEC   0
C1312                 22,3623   00000 1
 1313                 22,3624   00136 0           2DEC*  +5.797001734 E - 3 B -  0 *
C1313                 22,3625   37231 0
 1314                 22,3626   77771 0  VOFS     2DEC*  -2.133175242 E - 1 B -  9 *
C1314                 22,3627   45437 0
 1315                 22,3630   00000 1           2DEC   0
C1315                 22,3631   00000 1
 1316                 22,3632   77241 0           2DEC*  -6.533226733 E - 7 B + 15 *
C1316                 22,3633   50000 1
 1317                 22,3634   01303 0  JOFS2    2DEC*  +1.226559287 E -15 B + 45 *
C1317                 22,3635   02015 1
 1318                 22,3636   01731 0  MAOFP2   2DEC*  +5.167109434 E + 8 B - 33 *
C1318                 22,3637   21421 0

 1319                 22,3640   77602 0  TTF/4NU1 DEC*   -2.500000000 E + 2 B - 15 *

 1320                 22,3641   00014 1  AIFS     2DEC*  +1.236735582 E - 5 B +  6 *
C1320                 22,3642   36766 0
 1321                 22,3643   00013 0           2DEC*  +6.312364424 E -13 B + 30 *
C1321                 22,3644   03266 0
 1322                 22,3645   01372 0           2DEC*  +4.336466703 E -11 B + 30 *
C1322                 22,3646   34106 1
```

L SECOND DPS GUIDANCE USER'S OWN PAGE NO. 38 S3 E4

```
 1323                 22,3647   73321 0  TTF/4NU2 DEC*   -4.700000000 E + 3 B - 15 *

 1324                 22,3650   00004 0  A2FS     2DEC*  +4.231238847 E - 6 B +  6 *
C1324                 22,3651   15764 0
 1325                 22,3652   00000 1           2DEC   0
C1325                 22,3653   00000 1
 1326                 22,3654   00523 0           2DEC*  +1.930634433 E -11 B + 30 *
C1326                 22,3655   24403 0
 1327                 22,3656   14577 1  R2FS     2DEC*  +6.684376002 E + 6 B - 24 *
C1327                 22,3657   26600 0
 1328                 22,3660   00000 1           2DEC   0
C1328                 22,3661   00000 1
 1329                 22,3662   00000 1           2DEC*  +6.577892482 E - 6 B -  0 *
C1329                 22,3663   03346 0
 1330                 22,3664   77775 1  V2FS     2DEC*  -7.313936765 E - 2 B -  9 *
C1330                 22,3665   65065 1
 1331                 22,3666   00000 1           2DEC   0
C1331                 22,3667   00000 1
 1332                 22,3670   77770 1           2DEC*  -1.469364771 E - 8 B + 15 *
C1332                 22,3671   43440 0
 1333                 22,3672   76346 1  J2FS2    2DEC*  -1.376890825 E -15 B + 45 *
C1333                 22,3673   50661 0
 1334                 22,3674   01731 0  MA2FP2   2DEC*  +5.167109434 E + 8 B - 33 *
C1334                 22,3675   21421 0

 1335                 22,3676   77602 0  TTF/4NU3 DEC*   -2.500000000 E + 2 B - 15 *

 1336                 22,3677   00011 1  A3FS     2DEC*  +9.104196458 E - 6 B +  6 *
C1336                 22,3700   21371 1
 1337                 22,3701   00004 0           2DEC*  +2.300091883 E -13 B + 30 *
C1337                 22,3702   01370 1
 1338                 22,3703   00261 1           2DEC*  +1.008094512 E -11 B + 30 *
C1338                 22,3704   13043 1
```

```
P1339  ************************************************************************
R1340  SECOND DPS CONSTANTS
R1341  ************************************************************************

R1342  ADDRESS CONSTANTS

 1343  REF   6 LAST 887      22,3705   02000 0  E2DPSL    ECADR   E2DPS          FOR ACCESSING EBANK OF 2DPS
 1344  REF   7 LAST 909                   E4              EBANK=  E2DPS
 1345                        22,3706   02034 1  IGNALGL   2BCADR  IGNALG
C1345  REF   1               22,3707   44064 0
R1346
A1347                                                                THE NEXT TWO CONSTANTS MUST BE KEPT
A1348                                                                IN ORDER AND ADJACENT
 1349  REF   8 LAST 884      22,3710   01436 1  TABLTTFL  ADRES   TABLTTF  +3    ADRES TO REF TTF TABL
 1350                        22,3711   00002 0  DEGTTF-1  DCI     2              DEGREE-1 OF TTF POWER SERIES

 1351  REF   1                         E4              EBANK=  EMP11JOB
 1352                        22,3712   02035 0  RETPREBL  2BCADR  RETPREB
C1352  REF   1               22,3713   74064 0
 1353  REF   2 LAST 909                 E4              EBANK=  EMP11JOB
 1354                        22,3714   02257 0  RETBURNL  2BCADR  RETBURN
C1354  REF   1               22,3715   74064 0
 1355  REF  25 LAST 858                 E5              EBANK=  ETHROT
 1356                        22,3716   03476 1  THROTCOL  2BCADR  THROTCON
C1356  REF   1               22,3717   60065 1
R1357
R1358  ARITHMETIC FRACTIONS AND INTEGERS

 1359  REF  27 LAST 672                   7750  TSCALE    =       BIT12
R1360
 1361                        22,3720   00010 0  TSCALINV  DCI     00010
 1362                        22,3721   00000 1  ZEROPOS   DCI     00000          LO ORDER PART OF TSCALINV, AND
 1363                        22,3722   00000 1           DCI     00000          FIRST COMPONENT OF ZERO VECTOR
 1364                        22,3723   77777 0  ZERONEG   DCI     77777
 1365                        22,3724   77777 0           DCI     77777
 1366                        22,3725   00000 1           DCI     00000          LAST COMPONENT OF ZERO VECTOR, AND
 1367                        22,3726   00000 1  PIGNALG   DCI     00000          HI ORDER PART OF PIGNALG, TPIP UNITS
 1368                        22,3727   00310 0           DEC     +2 E +2 B -14  LO ORDER PART OF PIGNALG, TPIP UNITS

 1369                        22,3730   12525 0  1/3DP     2DEC    .3333333333
C1369                        22,3731   12525 0
 1370                        22,3732   14000 1  SP3/8     DCI     .3 B14
 1371                        22,3733   22000 1  SP9/16    DCI     .44 B14
 1372                        22,3734   25252 0  2/3DP     2DEC    .6666666667
C1372                        22,3735   25253 1
 1373  REF   1                22,3734           2DPS2/3   =       2/3DP
 1374                        22,3736   30000 1  SP3/4     DCI     .6 B14
 1375                        22,3737   31103 1  PI/4      2DEC    +3.14159265 B-2
C1375                        22,3740   36652 0
 1376                        22,3741   00021 1  NSCALR-1  DCI     00021          6 X 3 - 1 TO XFR 3 VCTRS, RN, VN, GDT/2
```

L SECOND DPS GUIDANCE USER'S OWN PAGE NO. 40 S3 E4

R1377

L PREBURN FOR APS2 USER'S OWN PAGE NO. 1 53

R0005 PREAPS2 IS A PROGRAM WHICH INITIALIZES **ASCENT** FOR THE 2ND APS
R0010 BURN. IT USES RN AND VN(TIG), PROVIDED BY MIDTOAVE THROUGH MP13, TO COM-
R0015 PUTE THE P, Q, AND S AXES FOR TRANSFORMATIONS, SETS 3 SWITCHES FOR PRO-
R0020 PER MODING OF ASCENT, AND TRANSFERS DATA FROM FIXED TO ERASABLE FOR USE
R0025 AS NOMINALS AT TIG.
R0030 IT CALLS ASCENT ONCE TO PROVIDE VT AT IGNITION, AND THEN RESETS THE
R0035 EXIT FROM ASCENT TO GO TO FINDCDUD ON SUBSEQUENT ASCENT ENTRIES.

```
0125                                    32,2000          BANK    32
0130  REF   3 LAST 701                      E4           EBANK=  PAX1S1
0135  REF   1                 32,2000  53'447 0  PREAPS2 DXCH    RRETURN
0136  REF   3 LAST 817         32,2001  3 5644 1          CA      PRIO21          GIVE LAMBERT A HIGHER PRIORITY THAN
0137  REF   1                 32,2002  55'451 1          TS      LAMPRIO         ASCENT, SO IT WILL FINISH.
0140  REF 100 LAST 898        32,2003  0 6112 0          TC      INTPRET
0145                          32,2004  77624 1           CALL
0150  REF   4 LAST 875         32,2005  60436 0                   VPATCHER
0155                          32,2006  77775 1           VLOAD
0160  REF  16 LAST 889         32,2007  01011 0                   RN              LOAD RN*2(N-29)
0165                          32,2010  53435 0           VXV     UNIT            RN X VN*2(N-36)
0170  REF  15 LAST 880         32,2011  01017 0                   VN              SAXIS*2(-1)
0175  REF   3 LAST 701         32,2012  02015 1           STORE   SAXIS           STORE SAXIS
0180                          32,2013  76435 1           VXV     VSL1            S X UR*2(-2)=Q1*2(-2), NORM TO S AND R
0185  REF   7 LAST 842         32,2014  01033 0                   UNITR           Q1*2(-1)
0190                          32,2015  63361 0           VXSC    PDVL            Q1* COS27*2(-1)
0195  REF   1                 32,2016  03602 0                   COS27           IN PDL(0)*2(-1)                          2
0200  REF   8 LAST 911         32,2017  01033 0                   UNITR           LOAD UR*2(-1)
0205                          32,2020  51361 1           VXSC    BVSU            UR SIN27*2(-1)
0210  REF   1                 32,2021  03604 0                   SIN27           Q1 COS27-UR SIN27 = Q
0215                          32,2022  77626 0           STADR                                                            0
0220  REF   3 LAST 700         32,2023  75770 0           STORE   QAXIS           STORE QAXIS
0225                          32,2024  76435 1           VXV     VSL1            Q X S*2(-2) = P*2(-2)
0230  REF   4 LAST 911         32,2025  02015 1                   SAXIS           P*2(-1)
0235  REF   4 LAST 911         32,2026  26001 1           STOVL   PAX1S1          STORE PAXIS
0240  REF   1                 32,2027  24111 0                   ENGNOM          LOAD NOMINAL AT,VE,TBUP
0245  REF   2 LAST 701         32,2030  26023 1           STOVL   AT              STORE IN ERASE
0250  REF   1                 32,2031  24117 0                   PREIGN          LOAD NOM. 1/DV1, 1/DV2, 1/DV3.
0255  REF   5 LAST 701         32,2032  16031 1           STODL   ATMEAS          STORE IN ERASE
02551 REF   1                 32,2033  26641 0                   DP.5
02552 REF   2 LAST 701         32,2034  16061 1           STODL   KR              LOAD PITCH LIMITING PARAMETER
0260  REF   3 LAST 847         32,2035  26643 1                   DP0             LOAD 0
0265  REF   2 LAST 701         32,2036  26037 1           STOVL   KR1             STORE IN KR1
0270  REF   1                 32,2037  03606 1                   VCONOM          LOAD NOM. RDOTD,YDOTD,ZDOTD
0275  REF   3 LAST 701         32,2040  16041 0           STODL   RDOTD
0276  REF   1                 32,2041  03576 0                   VTO-APS
0277  REF   2 LAST 701         32,2042  02057 1           STORE   VTO
0286                          32,2043  71331 0           SSP     DLOAD
0287  REF   3 LAST 705         32,2044  02051 1                   ASCRET
0290  REF   1                 32,2045  64067 1                   PRAPS           LOAD RETURN ADD. FROM ASCENT
0293  REF   1                 32,2046  03600 1                   TGONOM
0294  REF   5 LAST 735         32,2047  02141 1           STORE   TGO             TGO$2(-17)
```

L PREBURN FOR APS2 USER'S OWN PAGE NO. 2 53 E4

```
0295                          32,2050  43261 0          SR      DAD
0296                          32,2051  20614 0                  TIO             TGO$2(-28)
0297   REF   3 LAST 828       32,2052  02377 0                  TIGNITION
0298   REF   1                32,2053  02053 0          STORE   TCO             TCO$2(-28)
0300                          32,2054  43014 0          SET     CLEAR
0305   REF   2 LAST 701       32,2055  02067 1                  DIRECT          DIRECT=1
0306   REF   2 LAST 701       32,2056  02266 1                  BAKTO4          BAKTO4 = 0
0307                          32,2057  77614 1          SET                     TO AVOID CLOBBERING TCO DURING PREBURN
0308   REF   1                32,2060  02070 1                  PASS
0311                          32,2061  43014 0          CLEAR   SET             CLEAR GUESSW FOR NO COGAVAIL
0312   REF   1                32,2062  02263 1                  GUESSW
03121  REF   1                32,2063  02061 1                  DONESW          TO START LAMBERT
0315                          32,2064  52014 0          CLEAR   GOTO
0320   REF   3 LAST 702       32,2065  02271 1                  HC              HC=0
0325   REF   4 LAST 702       32,2066  64125 0                  ASCENT          GO TO ASCENT EQUATIONS
0330                          32,2067  43175 0  PRAPS   VLOAD   SET
0331   REF   6 LAST 892       32,2070  02233 1                  AXISD
03315  REF   2 LAST 912       32,2071  02063 0                  GUESSW          SET GUESSW FOR COGAVAIL
0332   REF   5 LAST 890       32,2072  25656 0          STOVL   POINTVSM        STORE FOR CALCMANU
0333   REF   3 LAST 729       32,2073  26641 0                  BODYVECT        LOAD UNIT X-AXIS
0334   REF  10 LAST 740       32,2074  01664 1          STORE   SCAXIS          STORE FOR CALCMANU
0335                          32,2075  43014 0          SET     CLEAR
03351  REF   2 LAST 912       32,2076  02061 1                  DONESW
03352  REF   2 LAST 702       32,2077  02273 0                  ENGOFFSW
03353                         32,2100  77776 1          EXIT
0336   REF   1                32,2101  3 2124 1         CA      CDUFAD          SET UP FOR NORMAL EXIT FROM ASCENT TO
0338   REF   4 LAST 911       32,2102  55'450 0         TS      ASCRET          FINDCDUD
0339   REF   4 LAST 704       32,2103  3 5643 0         CA      PRIO17          GIVE LAMBERT A LOWER PRIORITY
03391  REF   2 LAST 911       32,2104  55'451 1         TS      LAMPRIO
0340                          32,2105  0 0006 1         EXTEND
0342   REF   2 LAST 911       32,2106  3 1447 1         DCA     RRETURN         GO BACK TO MP13
0344   REF  35 LAST 826       32,2107  52 006 0         DXCH    Z
0355                          32,2110  05327 1  ENGNOM  2DEC    .00033086 B9    AT*2(9)
C0355                         32,2111  16434 0
0360                          32,2112  07446 0          2DEC    30.3030B-7      VE*2(-7)
C0360                         32,2113  31055 0
0365                          32,2114  26270 0          2DEC    91587.6B-17     TBUP*2(-17)
C0365                         32,2115  16315 1
0370                          32,2116  03627 1  PREIGN  2DEC    15.187B-7       1/DV1
C0370                         32,2117  35747 0
0375                          32,2120  03624 1          2DEC    15.157B-7       1/DV2
C0375                         32,2121  03045 0
0380                          32,2122  03620 0          2DEC    15.127B-7       1/DV3
C0380                         32,2123  10142 1
0400   REF   4 LAST 912                33,2640  DP.5     =       BODYVECT
0405   REF   5 LAST 912                33,2642  DP0      =       BODYVECT  +2
0419   REF   5 LAST 911                     E4          EBANK=  PAX151
0420   REF   5 LAST 892       32,2124  60703 0  CDUFAD  FCADR   FINDCDUD
```

L ASCENT STEERING USER'S OWN PAGE NO. 1 S3

```
R0001     PROGRAM NAME--ASCENT          BY--BERMAN
R0002       ASCENT IS AN E-GUIDANCE SCHEME WHICH PRODUCES A DESIRED UNIT THRUST VECTOR DURING ASCENT BURNS. WITH THE
R0004   CURRENT STATE AND ESTIMATED TGO,AND ESTIMATED VCO (VELOCITIES IN ASCENT ARE DEFINED IN LOCAL VERTICAL SYSTEMS),
R0006   RCO IS ESTIMATED. THIS ENABLES THE LAMBERT SUBROUTINE TO SOLVE FOR A BETTER VCO. THIS AND V ALLOW US TO IMPROVE
R0008   THE ESTIMATE OF TGO. FINALLY, TGO AND THE DESIRED CHANGES IN R AND V ARE USED TO COMPUTE UT.
R0010      MODING SWITCHES
R0011         HC--IF 0, ABVAL(RCO) IS CONSTRAINED TO A SPECIFIED VALUE-- IF 1, ABVAL(RCO) IS NOT CONSTRAINED, BUT IS
R0013               ESTIMATED.
R0014         PASS-- IF 0, USE LAMBERT TO UPDATE VCO-- IF 1, SKIP LAMBERT. PASS IS INVERTED EVERY ENTRY TO ASCENT, THUS
R0016               LAMBERT IS USED EVERY OTHER ENTRY.
R0017         DIRECT-- IF 0, SPECIFIED INJECTION CONDITIONS ARE USED AND PASS IS SET PERMANENTLY TO 1 AFTER THE FIRST
R0019               ENTRY-- IF 1, LAMBERT IS USED FOR TARGETING UNDER CONTROL OF          PASS.

R0021   CALLING SEQUENCE
R0022      ASCENT IS ENTERED IN INTERPRETIVE BY
A0023                                                  GOTO
A0024                                                       ASCENT

R0025   NORMAL EXIT
R0026      NORMAL EXIT FROM ASCENT IS BY
A0027                                                  GOTO
A0028                                                       ASCRET

R0029   WHERE THE PREAPS PROGRAM PUTS A RETURN ADDRESS IN ASCRET FOR THE FIRST (PRE-IGNITION) ENTRY, AND THEN STORES
R0031   FINDCDUD IN ASCRET SO THAT SUBSEQUENT EXITS WILL BE TO FINDCDUD.

R0032   DESCRIS
R0033      USES 118 ERASABLE LOCATIONS CURRENTLY ASSIGNED TO  AMEMORY  THRU  AMEMORY +117. (SEE PG. 32 OF SUNBURST FOR
R0035   VARIABLE NAMES.

R0036   RESERVED LOCATIONS
R0037      THE FOLLOWING 44 LOCATIONS MUST NOT BE DISTURBED DURING MP13 OR MP4 -- PAXIS1,QAXIS,SAXIS,ATMEAS,RDOTD,VDOTD,
R0039   ZDOTD,RCO,TGO,PCONS,PRATE,TINT,TREF,YCONS,ASCRET. THE REMAINING 74 LOCATIONS MAY BE USED BETWEEN EXIT FROM
R0041   ASCENT AND RE-ENTRY INTO THE THRUST MAGNITUDE FILTER, ATMAG.
 0042                                  32,2125          BANK   32
 0043   REF   2 LAST 912                  E4           EBANK= TCO
 0044                          32,2125  70375 1  ASCENT VLOAD  V/SC          FORM GRAVITY SCALED 2(10)M/CS/CS FROM
 0045   REF   2 LAST 842       32,2126  01065 0          GDT1/2              GDT1/2 SCALED 2(-7)M/CS
 0046   REF   1                32,2127  24672 1          2SEC(18)
 0047                          32,2130  50360 1          AXC,1  DOT          LOAD X1 WITH -5   (OLD NSHIFT CONTENTS)
 0048                          32,2131  00005 1          5
 0049   REF   9 LAST 911       32,2132  01033 0          UNITR               G,UR*2(9)=GR*2(9)
 0050                          32,2133  47315 0          PDVL   VXV          STORE IN PDL(0)                          2
 0051   REF  10 LAST 913       32,2134  01033 0          UNITR               LOAD UNITR*2(-1)
 0052   REF  16 LAST 911       32,2135  01017 0          VN                  UR*2(-1) X VN*2(-7)=H/R*2(-8)
 0053                          32,2136  56236 0          VSQ    DDV          H(2)/R(2)*2(-16)
 0054   REF   5 LAST 842       32,2137  01047 0          RMAG                H(2)/R(3)*2(9)
 0055                          32,2140  43352 1          SL1    DAD
 0056                          32,2141  77614 1          BON
 0057   REF   3 LAST 912       32,2142  02306 0          BAKTO4
```

L ASCENT STEERING USER'S OWN PAGE NO. 2 S3 E4

```
0058  REF  1                 32,2143  66307 0          GFKNOWN   DURING PRECOI, GO BACK TO MP4
0059  REF  2 LAST 701        32,2144  26111 1   STOVL  GEFF      STORE GEFFX2(9)(POS UP)
0060  REF  11 LAST 913       32,2145  01033 0          UNITR     LOAD URX2(-1)
0061                         32,2146  53435 0   VXV    UNIT      URX2(-1)XQX2(-1)=ZAXISXSIN
0062  REF  4 LAST 911        32,2147  02007 1          QAXIS     ZAXISX2(-1)
0063  REF  1                 32,2150  02077 0   STORE  ZAXIS     STORE ZAXIS
0064                         32,2151  57435 1   VXV    VCOMP     ZAXISX2(-1)XQAXISX2(-1)=-MAXISX2(-2)
0065  REF  5 LAST 914        32,2152  02007 1          QAXIS     MAXISX2(-2)
0066                         32,2153  63372 1   VSL1   PDVL      MAXISX2(-1) IN PDL(0)                    6
0067  REF  12 LAST 914       32,2154  01033 0          UNITR     LOAD URX2(-1)
0068                         32,2155  72441 0   DOT    SL1       URX2(-1).VX2(-7)=VRX2(-8)
0069  REF  17 LAST 913       32,2156  01017 0          VN        SHIFT TO VRX2(-7)
0070  REF  3 LAST 701        32,2157  26147 1   STOVL  RDOT      STORE IN RDOT
0071  REF  2 LAST 914        32,2160  02077 0          ZAXIS     LOAD ZAXISX2(-1)
0072                         32,2161  72441 0   DOT    SL1       ZAXISX2(-1).VX2(-7)=ZDOTX2(-8)           6
0073  REF  18 LAST 914       32,2162  01017 0          VN        SHIFT TO ZDOTX2(-7)
0074  REF  2 LAST 701        32,2163  26105 1   STOVL  ZDOT      STORE IN ZDOT
0075  REF  3 LAST 914        32,2164  02077 0          ZAXIS     LOAD ZAXISX2(-1)
0076                         32,2165  76435 1   VXV    VSL1      Z*2(-1)XUR*2(-1)=LAXIS*2(-2)
0077  REF  13 LAST 914       32,2166  01033 0          UNITR     SHIFT TO LAXIS*2(-1)
0078  REF  1                 32,2167  02071 0   STORE  LAXIS     STORE
0079                         32,2170  72441 0   DOT    SL1       LAXIS.VN=YDOT*2(-8)
0080  REF  19 LAST 914       32,2171  01017 0          VN        SHIFT TO YDOT*2(-7)
0081  REF  2 LAST 701        32,2172  26067 1   STOVL  YDOT      STORE IN YDOT
0082                         32,2173  00001 0          00D       LOAD MAXISX2(-1)
0083                         32,2174  62441 1   DOT    SL2       MAXISX2(-1).SX2(-1)=RZX2(-2)
0084  REF  5 LAST 911        32,2175  02015 1          SAXIS     SHIFT TO RZ
0085                         32,2176  63406 0   PUSH   DSQ       STORE RZ IN PDL(6)                       8
0086                         32,2177  41206 0   PUSH   DMP       STORE RZ(2) IN PDL(8)                    10
0087  REF  1                 32,2200  24670 0          DP3/80    3/80RZ(2)
0088                         32,2201  41215 1   DAD    DMP       1/16+3/80RZ(2)
0089  REF  1                 32,2202  24700 0          1/12TH    RZ(2)/12+3/80RZ(4)                       8
0090                         32,2203  41215 1   DAD    DMP       1/2+RZ(2)/12+3/80RZ(4)
0091  REF  2 LAST 911        32,2204  26641 0          DP.5      RZ(...)                                  6
0092                         32,2205  60405 0   DMP    SR2       Z*2(-26)
0093  REF  4 LAST 701        32,2206  02375 1          RCO       SHIFT TO Z*2(-28)
0094                         32,2207  50315 0   PDVL   DOT       STORE Z IN PDL(6)                        8
0095  REF  14 LAST 914       32,2210  01033 0          UNITR     LOAD URX2(-1)
0096  REF  6 LAST 914        32,2211  02007 1          QAXIS     URX2(-1).QX2(-1)=RYX2(-2)
0097  REF  1                 32,2212  02151 0   STORE  RY        STORE IN RY
0098                         32,2213  41316 0   DSQ    DMP       RY(2)X2(-4)                              8
0099  REF  1                 32,2214  24704 1          DP2/3H    RY(2)/24
0100                         32,2215  41215 1   DAD    DMP
0101  REF  1                 32,2216  24702 1          DP.25     1/4+RY(2)/24
0102  REF  2 LAST 914        32,2217  02151 0          RY        RY(1+RY(2)/6)/16
0103                         32,2220  42405 0   DMP    SL4       RCORY(1+RY(2)/6)X2(N-34)=YX2(N-34)
0104  REF  5 LAST 914        32,2221  02375 1          RCO       YX2(N-30)
0105                         32,2222  45325 1   PDDL   DSU       STORE IN PDL(8)                          10
0106  REF  6 LAST 911        32,2223  02141 1          TGO       LOAD TGO*2(-17)
0107  REF  1                 32,2224  24706 0          DTASC     (TGO-DT)*2(-17)
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0108	RLF	7 LAST 914	32,2225	02141	1		STORE	TGO	REPLACE IN TGO
0109			32,2226	71214	0		BOFF	DLOAD	IF HC=0, GO TO HOLDR
0110	REF	4 LAST 912	32,2227	02351	1			HC	
0111	REF	1	32,2230	64241	1			HOLDR	
0112	REF	4 LAST 914	32,2231	02147	1			RDOT	LOAD RDOT*2(-7)
0113			32,2232	41215	1		DAD	DMP	(RDOT+RDOTD)*2(-7)
0114	REF	4 LAST 911	32,2233	02041	0			RDOTD	
0115	RLF	8 LAST 915	32,2234	02141	1			TGO	TGO(RDOT+RDOTD)*2(-24)
0116			32,2235	43342	0		SR1	DAD	SHIFT TO RGO*2(-24)
0117	REF	6 LAST 913	32,2236	01047	0			RMAG	FORM RCO*2(-24)
0118			32,2237	77742	0		SR1		SHIFT TO RCO*2(-25)
0119	REF	6 LAST 914	32,2240	02375	1		STORE	RCO	STORE IN RCO
0120			32,2241	77614	1	HOLDR	BOFF		
0121	REF	3 LAST 912	32,2242	02347	0			DIRECT	
0122	REF	2 LAST 701	32,2243	64404	0			GAIN	
0123			32,2244	71214	0	LAMPREP	BOFF	DLOAD	IF LAMB NOT DONE, GO TO GAIN+1
0124	REF	3 LAST 912	32,2245	02341	0			DONESW	
0125	REF	3 LAST 915	32,2246	64404	0			GAIN	
0126	REF	3 LAST 914	32,2247	02067	1			YDOT	LOAD YDOT*2(-7)
0127			32,2250	65205	0		DMP	PDDL	YDOT TGO*2(-24)
0128	REF	9 LAST 915	32,2251	02141	1			TGO	PUSH DOWN 12
0129	REF	1	32,2252	02043	1			YDOTD	LOAD YDOTD*2(-7)
0130			32,2253	43205	1		DMP	DAD	YDOTD TGO*2(-24)
0131	REF	10 LAST 915	32,2254	02141	1			TGO	TGO(YDOT+YDOTD)*2(-24) 10
0132			32,2255	43257	0		SL*	DAD	YGO/2*2(N-30)
0133			32,2256	20172	1			0 -7,1	8
0134			32,2257	77626	0		STADR		YCO*2(N-30)
0135			32,2260	65736	0		STODL	32D	STORE IN PDL(32)
0136	REF	3 LAST 914	32,2261	02105	1			ZDOT	LOAD ZDOTX2(-7)
0137			32,2262	41215	1		DAD	DMP	(ZDOT+ZDOTD)X2(-7)
0138	REF	2 LAST 701	32,2263	02043	1			ZDOTD	TGO(ZDOT+ZDOTD)X2(-24)
0139	REF	11 LAST 915	32,2264	02141				TGO	
0140			32,2265	43257	0		SL*	DAD	SHIFT TO TGO(ZDOT+ZDOTD)X2(N-34)
0141			32,2266	20167	0			0 -10D,1	ZCOX2(N-33) 6
0142			32,2267	56271	0		DDV	DDV	ZRADCO/8
0143	REF	7 LAST 915	32,2270	02375	1			RCO	
0144	REF	2 LAST 882	32,2271	05740	1			PI/4	ZRADCO/2PI
0145			32,2272	71406	0		PUSH	COS	STORE IN PDL(6),TAKE 1/2COS 8
0146			32,2273	73525	1		PDDL	SIN	EXCH,ZRADCO/2PI WITH .5COS,TAKE .5SIN 8
0147			32,2274	74206	0		PUSH	VXSC	STORE 1/2SIN IN PDL(8) 10
0148	REF	6 LAST 914	32,2275	02015	1			SAX15	S/4SIN
0149			32,2276	74325	0		PDDL	VXSC	STORE IN PDL(10),LOAD1/2COS 16
0150			32,2277	00007	0			06D	P/4COS
0151	REF	6 LAST 912	32,2300	02001	1			PAXIS1	
0152			32,2301	77655	1		VAD		S/4SIN+P/4COS, 10
0153			32,2302	77725	1		PDDL		STORE IN PDL(10) 16
0154			32,2303	00041	1			32D	LOAD YCOX2(N-30)
0155			32,2304	65316	0		DSU	PDDL	YCO(2)X2(2N-60),STORE IN PDL(16) 18
0156	REF	8 LAST 915	32,2305	02375	1			RCO	LOAD RCOX2(N-30)

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0157                          32,2306   45316 1          DSU     DSU             (RCV(2)-YCO(2))X2(2N-60)                    16
0158                          32,2307   74366 1          SQRT    VXSC            (RCV(2)-YCO(2))(1/2)X2(N-30)XPDL(10)        10
0159                          32,2310   65372 1          VSL1    PDDL            SHIFT TO ROOT*(SSIN+PCOS)*2(N-31)
0160                          32,2311   00041 1                  32D             STORE PS TERMS IN PDL(10),LOAD YCO          16
0161                          32,2312   53361 0          VXSC    VAD             QYCOX2(N-31)
0162  REF   7 LAST 914       32,2313   02007 1                  QAXIS           ADD PS TERMS,GET RCOX2(N-31)                10
0163                          32,2314   77772 0          VSL1                    SHIFT TO RCOV*2(N-30)
0164                          32,2315   77614 1          BOFF
0165  REF   2 LAST 912       32,2316   02350 0                  PASS
0166  REF   1                 32,2317   64321 0                  OLDRCO
0167  REF   1                 32,2320   02340 1          STORE   RCOV            STORE CUTOFF POSITION
0168  REF   1                 32,2321   03614 1 OLDRCO   STORE   RCOTEMPV
0169                          32,2322   53435 0          VXV     UNIT
0170  REF   4 LAST 326        32,2323   02365 0                  RIVEC
0171                          32,2324   52165 1          SIGN    GOTO
0172  REF   1                 32,2325   03622 1                  TAGS            PATCH IN THRUST MAGNITUDE FILTER LOG
0173  REF   1                 32,2326   65054 0                  ASCPATCH        SECTION SO IT IS AT END OF BANK.

0174  REF   1                 32,2327   02153 1 ENDPATCH STORE   URCO
0175                          32,2330   53435 0          VXV     UNIT            GET LOCAL Z-AXIS
0176  REF   8 LAST 916        32,2331   02007 1                  QAXIS
0177                          32,2332   77601 0          SETPD                   CLEAR PDC
0178                          32,2333   00001 0                  00D             RESET PDC TO 0                              0
0179  REF   1                 32,2334   16133 1          STODL   H1              STORE H1
0180  REF   2 LAST 326        32,2335   02373 1                  TINT            LOAD TINT*2(-28)
0181                          32,2336   43025 1          DSU     BON
0182  REF   3 LAST 913        32,2337   02053 0                  TCO             IF PASS=1, USE RAW TFL
0183  REF   3 LAST 916        32,2340   02310 1                  PASS
0184  REF   1                 32,2341   64344 0                  USEIT           IF PASS=0, AVERAGE TFL
0185                          32,2342   70415 0          DAD     SR1
0186  REF   1                 32,2343   02143 0                  TFL
0187  REF   2 LAST 916        32,2344   02143 0 USEIT    STORE   TFL
0188                          32,2345   77614 1          CLEAR
0189  REF   4 LAST 915        32,2346   02261 0                  DONESW
0190                          32,2347   77614 1          BONCLR
0191  REF   1                 32,2350   02200 1                  CONVSW          LAMBERT'S ITERATING PROCESS IS NOT
0192  REF   1                 32,2351   65001 0                  ASCALARM        CONVERGING WELL TO VOVEC - HENCE ALARM
0193                          32,2352   77776 1          EXIT
0194  REF   3 LAST 912        32,2353   3 1451 0 ALARMRET CA     LAMPRIO
0195                          32,2354   0 0004 0         INHINT
0196  REF  31 LAST 870        32,2355   0 5516 0         TC      FINDVAC         SET UP LAMBERT JOB
0197  REF   1                           E3               EBANK=  SPLOC
0198                          32,2356   02711 1          2CADR   LAMBSET
C0198 REF   1                 32,2357   64063 0
0199                          32,2360   0 0003 1         RELINT
0200  REF   9 LAST 764        32,2361   10 067 1         CCS     NEWJOB          CHECK FOR LAMBERT INTERRUPT
0201  REF   8 LAST 764        32,2362   0 5532 0         TC      CHANG1
0202  REF 101 LAST 911        32,2363   0 6112 0 DUMPLOC TC      INTPRET         HIGH PRIO FOR LAMB DURING PREBURN PASS
0203                          32,2364   41575 0          VLOAD   PUSH            WILL CAUSE INTERRUPT HERE.
0204  REF   1                 32,2365   02324 0                  VOVEC           LOAD VOVEC, RESCALE FOR ASCENT
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0205			32,2366	72441 0	DOT	SL1	V1*2(-7) IN PDL(0)	
0206	REF 2 LAST 916		32,2367	02153 1		URCO	V1,URCO=RDOTD*2(-8)	
0207	REF 5 LAST 915		32,2370	26041 0	STOVL	RDOTD	STORE IN RDOTD	
0208			32,2371	00001 0		00D	LOAD V1*2(-7)	
0209			32,2372	72441 0	DOT	SL1	V1,H1*2(-8)=ZDOTD*2(-8)	
0210	REF 2 LAST 916		32,2373	02133 1		H1	SHIFT TO 2(-7)	
0211	REF 3 LAST 915		32,2374	26045 1	STOVL	ZDOTD	STORE IN ZDOTD,LOAD URCO*2(-1)	
0212	REF 3 LAST 917		32,2375	02153 1		URCO		
0213			32,2376	50235 0	VXV	DOT	URCOXH1*2(-2)=-UYCO*2(-2)	
0214	REF 3 LAST 917		32,2377	02133 1		H1	-UYCO,V1*2(-9)=-YDOTD*2(-9)	0
0215			32,2400	57512 0	SL2	DCOMP	+YDOTD*2(-7)	
0216	REF 2 LAST 915		32,2401	26043 1	STOVL	YDOTD		
0217	REF 2 LAST 916		32,2402	03614 1		RCOTEMPV		
0218	REF 2 LAST 916		32,2403	02340 1	STORE	RCOV		
0219			32,2404	40345 1	GAIN DLOAD	SETPD	LOAD YDOTD	
0220	REF 3 LAST 917		32,2405	02043 1		YDOTD		
0221			32,2406	00003 1		02D	SET PDC AT 2	2
0222			32,2407	41425 1	DSU	PUSH	(YDOTD-YDOT)X2(-7)=DYDOTX2(-7)	
0223	REF 4 LAST 915		32,2410	02067 1		YDOT	STORE IN PDL(2)	4
0224			32,2411	14041 1	STODL	32D	STORE DYDOT IN 32	(2
0225	REF 4 LAST 917		32,2412	02045 1		ZDOTD	LOAD ZDOT	
0226			32,2413	77625 0	DSU			
0227	REF 4 LAST 915		32,2414	02105 1		ZDOT		
0228			32,2415	00001 0	STORE	00D	STORE IN PDL(0)	
0229			32,2416	14037 0	STODL	30D	ALSO IN 30	
0230	REF 3 LAST 914		32,2417	02111 1		GEFF	LOAD GEFF	
0231			32,2420	72405 0	DMP	SL1	GEFF TGOX2(-8)	
0232	REF 12 LAST 915		32,2421	02141 1		TGO	SHIFT TO 2(-7)	
0233			32,2422	45325 1	PDDL	DSU	STORE IN PDL(4)	6
0234	REF 6 LAST 917		32,2423	02041 0		RDOTD	LOAD RDOTD	
0235	REF 5 LAST 915		32,2424	02147 1		RDOT	DRDOTX2(-7)	
0236			32,2425	00035 1	STORE	28D	STORE IN 28	
0237			32,2426	55425 1	DSU	VDEF	DRDOT-TGOGEFF,DEFINE VGX2(-7)	0,4
0238			32,2427	77626 0	STADR			
0239	REF 5 LAST 737		32,2430	75445 0	STORE	VGVECT	FOR DOWNLINK	
0240			32,2431	45246 0	ABVAL	DSU	GET VG(SCALAR)	
0241	REF 3 LAST 911		32,2432	02057 1		VTO	SUBTRACT TAILOFF	
0242			32,2433	41471 0	DDV	PUSH	VG*2(-7)/VE*2(-7)=VG/VE	
0243	REF 1		32,2434	02025 1		VE	STORE IN PDL(0)7)=VG/VE	2
0244			32,2435	44205 0	DMP	BDSU	KTVG/VE	
0245	REF 1		32,2436	03627 1		KT	1/2=KTVG/VE	
0246	REF 3 LAST 914		32,2437	26641 0		DP,5		
0247			32,2440	41215 1	DAD	DMP	1-KTVG/VE	
0248	REF 4 LAST 917		32,2441	26641 0		DP,5	VG/VE(1-KTVG/VE)=TGO/TBUP	0
0249			32,2442	41206 0	PUSH	DMP	STORE TGO/TBUP IN PDL(0)	2
0250	REF 1		32,2443	02027 0		TBUP	TGOX2(-17)	
0251	REF 13 LAST 917		32,2444	02141 1	STORE	TGO	STORE	
0252			32,2445	50025 0	DSU	BMN	IF TGO SMTHAN 4SEC,GO TO SET UP ENGOFF	
0253	REF 1		32,2446	24674 1		2SEC(16)	2*2(-16)=4*2(-17)	
0254	REF 1		32,2447	64714 1		ENGOFF		

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0255                          32,2450  47014 1  KEEPGOIN BONCLR RTB     DURING PRECO1, GO BACK TO MP4
0256  REF   4 LAST 913       32,2451  02206 1                  BAKTO4
0257  REF   1                 32,2452  66313 0                  TKNOWN
0258  REF   5 LAST 812       32,2453  33454 1                  LOADTIME
0259  REF   1                 32,2454  02107 0           STORE  TIME
0260                          32,2455  54345 1           DLOAD  SR
0261  REF  14 LAST 917        32,2456  02141 1                  TGO      TGO*2(-17)
0262                          32,2457  20614 0                  IID      TGO*2(-28)
0263  REF  12 LAST 887        32,2460  02346 1           STORE  TTGO     FOR DOWNLINK
0264                          32,2461  43214 1           BONCLR DAD      IF PASS ON, DO NOT COMPUTE TCO.
0265  REF   4 LAST 916        32,2462  02210 0                  PASS     CLEAR PASS ,GO TO AFTTCO
0266  REF   1                 32,2463  64472 1                  AFTTCO
0267  REF   2 LAST 918        32,2464  02107 0                  TIME     T+TGO=TCO*2(-28)
0268  REF   4 LAST 916        32,2465  16053 0           STODL  TCO      STORE TCO                                (2
0269  REF   1                 32,2466  24710 1                  T2       LOAD T2X2(-17)
0270                          32,2467  51025 1           DSU    BPL      T2-TGO
0271  REF  15 LAST 918        32,2470  02141 1                  TGO
0272  REF   1                 32,2471  64571 0                  AIMER    IF T2-TGO POS,GO TO AIMER

0273                          32,2472  45345 1  AFTTCO   DLOAD  DSU      LOAD TGO*2(-28)
0274  REF   3 LAST 918        32,2473  02107 0                  TIME     SUBTRACT 100 CS, 1/2DT
0275  REF   1                 32,2474  24664 0                  100CS    (T-.5DT)*2(-28)
0276  REF   1                 32,2475  16055 0           STODL  TREF     *2(-28)
0277  REF  16 LAST 918        32,2476  02141 1                  TGO      LOAD TGOX2(-17)
0278                          32,2477  43205 1           DMP    DAD      RDOT TGO*2(-24)
0279  REF   6 LAST 917        32,2500  02147 1                  RDOT     (R+RDOT TGO)*2(-24)
0280  REF   7 LAST 915        32,2501  01047 0                  RMAG
0281                          32,2502  44342 1           SR1    BDSU     *2(-25)
0282  REF   9 LAST 915        32,2503  02375 1                  RCO      RCO-R-RDOT TGO=DR*2(-25)
0283                          32,2504  14033 1           STODL  26D      STORE DR IN 26,LOAD TGO/TBUP
0284                          32,2505  43221 1           BDSU   DAD      1/2-TGO/TBUP
0285  REF   5 LAST 917        32,2506  26641 0                  DP.5
0286  REF   6 LAST 918        32,2507  26641 0                  DP.5     1-TGO/TBUP
0287                          32,2510  77624 1           CALL
0288  REF   1                 32,2511  65060 1                  LOGSUB   CALL LOG SUBROUTINE

0289                          32,2512  41461 1           SL     PUSH     SHIFT TO -L,STORE IN PDL(0)              2
0290                          32,2513  20206 1                  5
0291                          32,2514  44265 0           BDDV   BDSU     -TGO/L*2(-17)
0292  REF  17 LAST 918        32,2515  02141 1                  TGO
0293  REF   2 LAST 917        32,2516  02027 0                  TBUP     (TBUP+TGO/L)*2(-17)=D12*2(-17)
0294                          32,2517  45325 1           PDDL   DSU      D12 IN PDL(2)                            4
0295  REF  18 LAST 918        32,2520  02141 1                  TGO
0296  REF   1                 32,2521  24676 0                  T3       TGO-T3
0297                          32,2522  71244 0           BPL    DLOAD    IF TGO-T3 POS,GO TO RATE
0298  REF   1                 32,2523  64531 1                  RATER
0299  REF   4 LAST 911        32,2524  26643 1                  DPO      SET B=0
0300  REF   1                 32,2525  02131 0           STORE  PRATE
0301                          32,2526  77614 1           SETGO            SET HC=1,GO TO CONST
0302  REF   5 LAST 915        32,2527  02031 1                  HC
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0303  REF  1                 32,2530  64553 0                  CONST
0304                         32,2531  45345 1  RATER   DLOAD   DSU      TGO
0305  REF  19 LAST 918       32,2532  02141 1                  TGO
0306                         32,2533  00003 1                  02D      TGO-D12=D21X2(-17)
0307                         32,2534  70525 1          PDDL    SR1      D21 IN PDL(4)                                  6
0308  REF  20 LAST 919       32,2535  02141 1                  TGO      LOAD TGOX2(-17),SHIFT TO 1/2
0309                         32,2536  54225 0          DSU     SL       .5TGO-D21=D*2(-17)
0310                         32,2537  00005 1                  04D      SHIFT TO D*2(-12)
0311                         32,2540  20206 1                  05D
0312                         32,2541  41325 0          PDDL    DMP      STORE D IN PDL(6),LOADDRDOT*2(-7)              8
0313                         32,2542  00035 1                  28D      D21 DRDOT*2(-24)
0314                         32,2543  00005 1                  04D
0315                         32,2544  45342 0          SR1     DSU      SHIFT TO 2(-25)
0316                         32,2545  00033 1                  26D      (D21 DRDOT-DR)*2(-25)
0317                         32,2546  56271 0          DDV     DDV      DIVIDE BY TGO*2(-17)
0318  REF  21 LAST 919       32,2547  02141 1                  TGO      DIVIDE BY D*2(-12),GET B*2(4)                  6
0319                         32,2550  77601 0          SETPD                                                           4
0320                         32,2551  00005 1                  04D
0321  REF  2 LAST 918        32,2552  02131 0          STORE   PRATE    STORE B*2(4)
0322                         32,2553  56345 0  CONST   DLOAD   DDV      LOAD DRDOTX2(-7)
0323                         32,2554  00035 1                  28D      DRDOT/-LX2(-7)
0324                         32,2555  00001 0                  00D
0325                         32,2556  65342 1          SR1     PDDL     EXCH DRDOT/-L*2(-8) WITH D12 IN PDL(2)         4
0326                         32,2557  54205 1          DMP     SL       D12 PRATE*2(-16)
0327  REF  3 LAST 919        32,2560  02131 0                  PRATE    SHIFT TO 2(-8)
0328                         32,2561  20206 1                  5
0329                         32,2562  77621 1          BDSU                PULL DRDOT/-L,GET A*2(-8)                      2
0330                         32,2563  77626 0          STADR
0331  REF  1                 32,2564  61664 1          STODL   PCONS    STORE A*2(-8) IN PCONS
0332                         32,2565  00041 1                  32D      LOAD DYDOTX2(-7)
0333                         32,2566  70471 1          DDV     SR1      DYDOT/-L*2(-7)=C*2(-7)
0334                         32,2567  00001 0                  00D      SHIFT TO 2(-8)
0335  REF  1                 32,2570  02065 0          STORE   YCONS    STORE C*2(-8) IN YCONS
0336                         32,2571  77601 0  AIMER   SETPD
0337                         32,2572  00001 0                  00D                                                     0
0338                         32,2573  45345 1          DLOAD   DSU
0339  REF  4 LAST 918        32,2574  02107 0                  TIME
0340  REF  2 LAST 918        32,2575  02055 0                  TREF     (T-T0)X2(-28)
0341                         32,2576  54205 1          DMP     SL       B(T-T0)*2(-24)
0342  REF  4 LAST 919        32,2577  02131 0                  PRATE    SHIFT TO 2(-8)
0343                         32,2600  20221 1                  16D
0344                         32,2601  56215 1          DAD     DDV      (A+B(T-T0))*2(-8)
0345  REF  2 LAST 919        32,2602  02113 0                  PCONS    DIVIDE BY TBUP*2(-17)
0346  REF  3 LAST 918        32,2603  02027 0                  TBUP
0347                         32,2604  74225 1          DSU     VXSC     SUBTRACT GEFF, GET ATR*2(9)
0348  REF  4 LAST 917        32,2605  02111 1                  GEFF
0349  REF  15 LAST 914       32,2606  01033 0                  UNITR    ATR UR*2(8)
0350                         32,2607  56325 0          PDDL    DDV      STORE IN PDL(0),LOAD C*2(-8)                   6
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L ASCENT STEERING USER'S OWN PAGE NO. 8 S3 E4

```
0351   REF   2 LAST 919     32,2610   02065 0                 YCONS
0352   REF   4 LAST 919     32,2611   02027 0                 TBUP        C/TBUP*2(9)=ATY*2(9)
0353                        32,2612   53361 0          VXSC   VAD         ATY LAXIS*2(8)
0354   REF   2 LAST 914     32,2613   02071 0                 LAXIS       (ATY LAXIS+ATR UR)*2(8)=AH*2(8)          0
0355                        32,2614   41572 1          VSL1   PUSH        SHIFT TO AH*2(9),STORE IN PDL(0)         6
0356                        32,2615   65246 1          ABVAL  PDDL        AH2X2(18)IN PDL(34),AMMAG IN MPAC
0357   REF   3 LAST 911     32,2616   02023 1                 AT          STORE AHMAG IN PDL( 6),LOAD AT           8
0358                        32,2617   45316 1          DSQ    DSU         AT(2)X2(18)
0359                        32,2620   00043 0                 34D         (AT(2)-AH2)X2(18)=ATP2X2(18)
0360                        32,2621   41325 0          PDDL   DMP         STORE IN PDL( 8)                        10
0361   REF   4 LAST 920     32,2622   02023 1                 AT          LOAD ATX2(9)
0362   REF   3 LAST 911     32,2623   02061 1                 KR          AT KRX2(8)
0363                        32,2624   41552 0          SL1    PUSH        2(9),STORE IN PDL(10)                   12
0364                        32,2625   45316 1          DSQ    DSU         AT(2)KR(2)X2(18)
0365                        32,2626   00043 0                 34D          -AH2X2(18) =ATP3X2(18)
0366                        32,2627   71240 1          BMN    DLOAD       IF ATP3 NEG,GO TO AIMING
0367   REF   1             32,2630   64635 0                 AIMING
0368                        32,2631   00011 1                 8D          LOAD ATP2X2(18)
0369                        32,2632   77766 0          SQRT               ATPX2(9)
0370                        32,2633   77650 1          GOTO
0371   REF   1             32,2634   64645 1                 AIMED

0372                        32,2635   55345 0  AIMING  DLOAD  BDDV        KR AT/AH=KH FROMPDL(10,6)                8
0373                        32,2636   00007 0                 06D
0374                        32,2637   77761 1          VXSC               KH AH*2(9)
0375                        32,2640   00001 0                 00D
0376                        32,2641   14001 0          STODL  00D         STORE NEW AH IN PDL(0)
0377   REF   5 LAST 920     32,2642   02023 1                 AT          LOAD ATX2(9)
0378                        32,2643   77605 1          DMP                AT(1-KR(2))(1/2)X2(9)=ATPX2(9)
0379   REF   3 LAST 911     32,2644   02037 1                 KR1

0380                        32,2645   74365 1  AIMED   SIGN   VXSC        GIVE SIGN TO ATP
0381                        32,2646   00037 0                 30D
0382   REF   4 LAST 914     32,2647   02077 0                 ZAXIS       ATP ZAXISX2(8)
0383                        32,2650   53372 1          VSL1   VAD         ATP ZAXISX2(9)
0384                        32,2651   00001 0                 00D         (ATPZAXIS+AH)X2(9)
0385                        32,2652   77656 1                 UNIT        GET UT*2(-1)
0386   REF   7 LAST 912     32,2653   02233 1          STORE  AXISD
0387                        32,2654   45001 1          SETPD  CALL
0388                        32,2655   00001 0                 0
0389   REF   5 LAST 912     32,2656   02050 0                 ASCRET
0390                        32,2657   77776 1          EXIT
0391   REF 142 LAST 896     32,2660   0 4161 0  ASCTERM  IC     PHASCHNG    THE SERVEXIT PHASE CHANGE
0392                        32,2661   00035 1          DCI    00035
0393   REF 104 LAST 892     32,2662   1 5567 1         ICF    ENDOFJOB

0394                        32,2663   00000 1  100CS   2DEC   100
C0394                       32,2664   00144 0
0395                        32,2665   12702 1          2DEC   0.34        KT WAS HERE, BUT NOW IS IN ERASABLE.
C0395                       32,2666   21727 0
```

```
0396                          32,2667   01146 0  DP3/80   2DEC    0.0375
C0396                         32,2670   14632 0
0397                          32,2671   00014 1  2SEC(18) 2DEC    200B-18
C0397                         32,2672   20000 0
0398                          32,2673   00062 0  2SEC(16) 2DEC    200 B-16
C0398                         32,2674   00000 1
0399                          32,2675   00175 1  T3       2DEC    1000 B-17
C0399                         32,2676   00000 1
0400                          32,2677   02525 1  1/12TH   2DEC    0.083333333
C0400                         32,2700   12525 0
0401                          32,2701   10000 0  DP.25    2DEC    0.25
C0401                         32,2702   00000 1
0402                          32,2703   25252 0  DP2/3H   2DEC    .666666667
C0402                         32,2704   25253 1
0403                          32,2705   00031 0  DTASC    2DEC    200 B-17
C0403                         32,2706   00000 1
0404                          32,2707   00031 0  T2       2DEC    200 B-17
C0404                         32,2710   00000 1
0405  REF 102 LAST 916        32,2711   0 6112 0 LAMBSET  TC      INTPRET         CALL FOR LAMBERT SUBR.
0406                          32,2712   77624 1          CALL
0407  REF   1                 32,2713   74625 0                  LAMBERT
0408                          32,2714   71214 0 ENGOFF   BON     DLOAD
0409  REF   3 LAST 912        32,2715   02313 1                  ENGOFFSW
0410  REF   1                 32,2716   64450 1                  KEEPGOIN
0411  REF  22 LAST 919        32,2717   02141 1                  TGO
0412                          32,2720   77452 1          SL3     EXIT
0413                          32,2721   0 0004 0         INHINT
0414  REF   6 LAST 828        32,2722   3 7751 0         CAF     EBANK4          INSURE THAT THE EBANK IS SET PROPERLY
0415  REF  66 LAST 889        32,2723   54 003 0         TS      EBANK
0416  REF  23 LAST 921                        E4        EBANK=  TGO
0417  REF 372 LAST 902        32,2724   3 0144 0         CA      MPAC
0418  REF   1                 32,2725   55'566 1         TS      ENGOFFDT
0419                          32,2726   0 0006 1         EXTEND
0420  REF   1                 32,2727   6 2751 0         BZMF    ENGOFF2
0421  REF 125 LAST 870        32,2730   0 5663 1         TC      WAITLIST
0422  REF  24 LAST 921                        E4        EBANK=  TGO
0423                          32,2731   02757 0          2CADR   ENGOFF3
C0423 REF   1                 32,2732   64064 1
0424  REF   1                 32,2733   4 0100 1         CS      FLAGWRD4        BYPASS PHASCHNG WHEN IN MP 13.
0425  REF  30 LAST 884        32,2734   7 7754 1         MASK    BIT8
0426                          32,2735   0 0006 1         EXTEND
0427  REF   1                 32,2736   1 2744 0         BZF     ENGOFF1

0428  REF 143 LAST 920        32,2737   0 4161 0         TC      PHASCHNG        RESTART PROTECTION FOR ENGINOFF CALL
0429                          32,2740   47012 1          OCT     47012
0430  REF   2 LAST 921        32,2741   76211 1          -GENADR ENGOFFDT
0431  REF  25 LAST 921                        E4        EBANK=  TGO
0432                          32,2742   02757 0          2CADR   ENGOFF3
C0432 REF   2 LAST 921        32,2743   64064 1
0433                          32,2744   0 0003 1 ENGOFF1 RELINT
```

L ASCENT STEERING USER'S OWN PAGE NO. 10 S3 E4

```
0434   REF 103 LAST 921     32,2745  0 6112 0          IC      INTPRET
0435                        32,2746    52014 0         SET     GOTO
0436   REF   4 LAST 921     32,2747    02073 1                 ENGOFFSW
0437   REF   2 LAST 921     32,2750    64450 1                 KEEPGOIN
0438   REF   1              32,2751  0 2773 0 ENGOFF2  IC      EXEUNT
0439   REF 133 LAST 865     32,2752  0 5206 0          IC      BANKCALL
0440   REF  10 LAST 762     32,2753    40263 1         CADR    ENGINOFF
0441   REF 134 LAST 922     32,2754  0 5206 0          IC      BANKCALL
0442   REF  10 LAST 748     32,2755    40114 1         CADR    STOPRATE
0443   REF   1              32,2756  1 2660 1          ICF     ASCTERM
0444   REF   2 LAST 922     32,2757  0 2773 0 ENGOFF3  IC      EXEUNT
0445   REF  86 LAST 765     32,2760  0 5270 1          IC      IBNKCALL
0446   REF  11 LAST 922     32,2761    40263 1         CADR    ENGINOFF
0447   REF  87 LAST 922     32,2762  0 5270 1          IC      IBNKCALL
0448   REF  11 LAST 922     32,2763    40114 1         CADR    STOPRATE
0449   REF   2 LAST 921     32,2764  4 0100 1          CS      FLAGWRD4      BYPASS PHASCHNG WHEN IN MP 13.
0450   REF  31 LAST 921     32,2765  7 7754 1          MASK    BIT8
0451                        32,2766  0 0006 1          EXTEND
0452   REF 118 LAST 870     32,2767  1 5727 1          BZF     TASKOVER

0453   REF 144 LAST 921     32,2770  0 4161 0          IC      PHASCHNG      DEACTIVATE GROUP 2 AFTER SUCCESSFUL CALL
0454                        32,2771    00002 0         QCI     00002

0455   REF 119 LAST 922     32,2772  0 5727 0          IC      TASKOVER
0456                        32,2773  0 0006 1 EXEUNT   EXTEND                DISENGAGE THE GUIDANCE EQUATIONS
0457   REF   1              32,2774  3 3000 1          DCA     SERVEXAD
0458   REF  32 LAST 890     32,2775    53073 0         DXCH    AVGEXIT
0459   REF 248 LAST 904     32,2776  0 0002 0          IC      Q

0460   REF  24 LAST 824                    E5          EBANK=  DVCNTR
0461                        32,2777    02324 0 SERVEXAD 2CADR  SERVEXIT
C0461  REF  12 LAST 823     32,3000    60065 1
0462                        32,3001    77776 1 ASCALARM EXIT
0463   REF  45 LAST 893     32,3002  0 4755 1          IC      ALARM
0464                        32,3003    00405 0         QCI     00405         LAMBERT ITERATIONS NOT CONVERGING
0465   REF   1              32,3004  1 2353 1          ICF     ALARMRET

R0466  ************************************************************************
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L THRUST MAGNITUDE FILTER USER'S OWN PAGE NO. 1 53

R000003 PROGRAM NAME - ATMAG

R000005 MODIFICATION BY - BERMAN AND CATTANACH

R000007 FUNCTIONAL DESCRIPTION -

R000009 THE THRUST MAGNITUDE FILTER CONVERTS ABDELV TO M/CS, INVERTS AND COMBINES IT WITH TWO PRECEDING
R000012 INPUTS TO PRODUCE THE INVERTED EXHAUST VELOCITY, BURN UP TIME, AND ANTICIPATED THRUST ACCELERATION FOR
R000016 THE NEXT TIME INCREMENT. THRUST MAGNITUDE FILTER IS BYPASSED UNTIL AFTER THE MAIN ENGINE GOES ON.

R00002 CALLING SEQUENCE - ATMAG IS ENTERED BY EXTEND AND EXTEND
R000022 DCA ATMAGAD DCA ATMAG4
R000024 DXCH AVGEXIT DXCH AVGEXIT
R000026 NORMAL EXIT - FROM ATMAG BY GOTO
R000028 ASCENT

R00003 OUTPUT - INVERTED EXHAUST VELOCITY, BURN UP TIME, AND ANTICIPATED THRUST ACCELERATION

R000034 ERASABLE INITIALIZATION REQUIRED - THIS IS DONE BY PRE-APS PROGRAMS

R000036 DEBRIS - ABDVCONV, 1/DV1, 1/DV2, 1/VE, TBUP, AT.

R000038 ALARM OR ABORT EXIT MODES -

R00004 SUBROUTINES CALLED - NONE

```
0002                                  32,3005          BANK   32

0004   REF   5 LAST 918                  E4           EBANK= TCO              EBANK4

0007   REF 104 LAST 922     32,3005  0 6112 0  ATMAG   IC     INTPRET
0008                        32,3006   57545 1          DLOAD  DCOMP            LOAD -VE*2(-6)
0010   REF   6 LAST 847     32,3007   02556 0          NEGVEX
0012                        32,3010   77742 0          SR1
0014   REF   2 LAST 917     32,3011   02025 1          STORE  VE               VE*2(-7)
0016                        32,3012   67201 0          SETPD  SLOAD
0018                        32,3013   00001 0                 00D
0019   REF   1              32,3014   25052 1                 BIT4H
0020                        32,3015   77471 0          DDV    EXIT
0022   REF   2 LAST 844     32,3016   03624 1                 ABDVCONV

0024   REF 373 LAST 921     32,3017   52 145 0         DXCH   MPAC
0025   REF   1              32,3020   53'435 0         DXCH   1/DV3
0026   REF   1              32,3021   53'433 0         DXCH   1/DV2
0028   REF   1              32,3022   53'431 1         DXCH   1/DV1
0030   REF 374 LAST 923     32,3023   52 145 0         DXCH   MPAC             MPAC=1/DV0*2(-7)
0032   REF 105 LAST 923     32,3024  0 6112 0          IC     INTPRET
0034                        32,3025   77615 0          DAD
0035   REF   2 LAST 923     32,3026   02031 1                 1/DV1            (1/DV0+1/DV1)*2(-7)
0036                        32,3027   43215 0          DAD    DAD
```

L THRUST MAGNITUDE FILTER USER'S OWN PAGE NO. 2 53 E4

```
0037  REF  2 LAST 923    32,3030  02033 0                    1/DV2
0038  REF  2 LAST 923    32,3031  02035 0                    1/DV3          SUM(1/DV)*2(-7)
0039                     32,3032  41205 0          DMP       DMP            VE SUM(1/DV)*2(-14)
0040  REF  3 LAST 923    32,3033  02025 1                    VE             DT VE SUM(1/DV)*2(-21)
0041  REF  3 LAST 846    32,3034  21400 0                    2SEC(9)
0042                     32,3035  65252 1          SL3       PDDL           1/8 DT VE SUM(1/DV)*2(-17)
0043  REF  5 LAST 920    32,3036  02027 0                    TBUP           LOAD TBUP*2(-17)
0044                     32,3037  43342 0          SR1       DAD            1/2 OLD TBUP*2(-17)
0045                     32,3040  77625 0          DSU
0046  REF  1             32,3041  25053 0                    6SEC(18)       GET NEW TBUP *2(-17)
0047  REF  6 LAST 924    32,3042  16027 0          STODL     TBUP
0048  REF  4 LAST 924    32,3043  02025 1                    VE
0049                     32,3044  56342 1          SR1       DDV            VE*2(-8)
0050  REF  7 LAST 924    32,3045  02027 0                    TBUP           AT*2(9)
0051  REF  6 LAST 920    32,3046  02023 1          STORE     AT
0086                     32,3047  77650 1  FILTEND  GOTO
0088  REF  5 LAST 912    32,3050  64125 0                    ASCENT

0096                     32,3051  00010 0  BIT4H     OCT       10
0098                     32,3052  00045 0  6SEC(18)  2DEC      6000B-18
C0098                    32,3053  20000 0
0100  REF  1             32,3054  25715 0  ASCPATCH  STOVL     UNNORM         PATCH FROM ASCENT STEERING LOG SECTION.
0101  REF  3 LAST 917    32,3055  02340 1                    RCOV
0102                     32,3056  52056 0          UNIT      GOTO
0103  REF  1             32,3057  64327 0                    ENDPATCH
```

L LOGSUB ROUTINE USER'S OWN PAGE NO. 1 S3

```
R0001   INPUT....X IN MPAC
R0002   OUTPUT....LOG(X)/32 IN MPAC
R0003
 0004                                32,3060            BANK   32
 0005                        32,3060 44301 0 LOGSUB     NORM   BDSU
 0006   REF 375 LAST 923     32,3061 00153 0            DAS    MPAC +6
 0007   REF   1              32,3062 25127 1            TC     ALMOST1
 0008                        32,3063 77776 1            EXIT
 0009   REF   3 LAST 782     32,3064 0 7274 1           TC     POLY
 0010                        32,3065 00006 1            DEC    6
 0011                        32,3066 00000 1            2DEC   .0000000060
C0011                        32,3067 00002 0
 0012                        32,3070 76777 1            2DEC   -.0312514377
C0012                        32,3071 77175 1
 0013                        32,3072 77400 0            2DEC   -.0155686771
C0013                        32,3073 75416 0
 0014                        32,3074 77507 0            2DEC   -.0112502068
C0014                        32,3075 65515 0
 0015                        32,3076 77741 0            2DEC   -.0018545108
C0015                        32,3077 63547 1
 0016                        32,3100 77052 0            2DEC   -.0286607906
C0016                        32,3101 55373 0
 0017                        32,3102 01167 0            2DEC   .0385598563
C0017                        32,3103 30361 0
 0018                        32,3104 76520 1            2DEC   -.0419361902
C0018                        32,3105 75267 0
 0019   REF 260 LAST 904     32,3106 3 7767 0           CAF    ZERO
 0020   REF 376 LAST 925     32,3107 54 146 0           TS     MPAC +2
 0021                        32,3110 0 0006 1           EXTEND
 0022   REF   1              32,3111 3 3125 1           DCA    CLOG2/32
 0023   REF 377 LAST 925     32,3112 52 145 0           DXCH   MPAC
 0024   REF  66 LAST 902     32,3113 52 122 1           DXCH   BUF +1
 0025   REF 378 LAST 925     32,3114 3 0152 1           CA     MPAC +6
 0026   REF  12 LAST 901     32,3115 0 7357 1           TC     SHORTMP
 0027   REF 379 LAST 925     32,3116 52 146 0           DXCH   MPAC +1
 0028   REF 380 LAST 925     32,3117 52 145 0           DXCH   MPAC
 0029   REF  67 LAST 925     32,3120 52 122 1           DXCH   BUF +1
 0030   REF 381 LAST 925     32,3121 20 145 0           DAS    MPAC
 0031   REF 106 LAST 923     32,3122 0 6112 0           TC     INTPRET
 0032                        32,3123 43476 0            DCOMP  RVQ
 0033                        32,3124 00542 1 CLOG2/32   2DEC   .0216608494
C0033                        32,3125 34414 1
 0034                        32,3126 37777 1 ALMOST1    2DEC   .999999999
C0034                        32,3127 37777 1
```

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L       LAMB                                                    USER'S OWN PAGE NO.   1          S3

 000101                              36,2625          BANK   36
 000102 REF  II LAST 912               E3             EBANK= SCAXIS


R000103  PROGRAM NAME ... LAMBERT ROUTINE                                DATE ... 11/29/66
R000105
R000106  MOD NO ... 3                                                   LOG SECTION ...LAMB
R000108                                                                 ASSEMBLY ... SUNBURST REVISION 03
R00011
R000111  MODIFICATION BY ... J.J. BESTER AND L.G. HULL
R000112  FUNCTIONAL DESCRIPTION ...

R000113      THIS SUBROUTINE SOLVES FOR THE CONIC TRAJECTORY BETWEEN ROVEC AND RIVEC WHICH SATISFIES A SPECIFIED TIME
R000115  OF FLIGHT, TFL.  A SLOPE ITERATOR IS USED TO FORCE THE TIME OF FLIGHT TO CONVERGE.


R000117  CALLING SEQUENCE:

R000118  THIS ROUTINE IS CALLED IN THE INTERPRETIVE MODE BY
R000119                                                          CALL
R00012                                                           LAMBERT


R000122  NORMAL EXIT MODE:

R000123  EXIT FROM THIS ROUTINE IS IN BASIC BY
R000124                                                          TCF     ENDOFJOB


R000126  OUTPUT:

R000127  THE OUTPUT OF THIS ROUTINE (WITH SCALING INDICATED IN PARENTHESES) CONSISTS OF ...

R000129  VOVEC (+7)     =THE REQUIRED VELOCITY VECTOR IN METERS/CENTISECONDS

R00013   DONESW         =THE DONE SWITCH INDICATING WHETHER THE JOB HAS BEEN COMPLETED.  WHEN THE JOB IS DONE IT
R000132                   IS TURNED ON.

R000133  CONVSW         = THE CONVERGENCE SWITCH INDICATING WHETHER THE ITERATION PROCESS HAS CONVERGED.  IT IS TURNED
R000135                   ON IF CONVERGENCE HAS NOT OCCURRED, BUT AN ESTIMATE OF VOVEC IS NEVERTHELESS GIVEN.


R000137  INPUT:

R000138  THE QUANTITIES INPUTED AND THEIR SCALE FACTORS ARE ...
```

L LAMB USER'S OWN PAGE NO. 2 53

```
R000139 RCOV   (+25)   -INITIAL POSITION IN METERS.
R00014  RIVEC  (+25)   -THE TARGET POSITION IN METERS.

R000141 TFL    (+28)   -TIME OF FLIGHT IN CENTISECONDS.

R000142 UNNORM (+1)    -A UNIT VECTOR IN THE DIRECTION OF THE ANGULAR MOMENTUM  VECTOR.

R000144 TAG5           -A PARAMETER SET TO -0.5 IF THE TRUE ANOMALY DIFFERENCE BETWEEN ROVEC AND RIVEC IS MORE THAN
R000146                 180 DEGREES.  OTHERWISE IT SHOULD BE SET TO +0.5.

R000147 GUESSW         -THE GUESS SWITCH, IF A FIRST GUESS TO THE COTANGENT OF THE FLIGHT PATH ANGLE IS AVAILABLE THE
R000149                 SWITCH SHOULD BE SET , CLEAR IF NO GUESS IS FORTHCOMING.

R00015  COGAVAIL (+5) -THE AVAILABLE COTANGENT OF THE FLIGHT PATH ANGLE.  IF A GUESS IS AVAILABLE THE GUESSW SHOULD BE
R000152                 SET AND THE GUESS PLACED HERE BEFORE THE LAMBERT ROUTINE IS ENTERED.  AFTER ONE PASS THROUGH
R000154                 LAMBERT, THE LAST ITERATED VALUE OF THE COTANGENT IS PLACED IN COGAVAIL AND  MAY BE USED AS THE
R000156                 GUESS FOR THE NEXT PASS.


R000157 THE FOLLOWING SWITCHES ARE IN THIS ROUTINE , THOUGH THEY ARE NOT USED FOR THIS PARTICULAR MISSION AND ARE
R000159 ALWAYS CLEAR IN 206.

R00016  MOONSW         - THE MOON SWITCH: 1-INSIDE THE SPHERE OF INFLUENCE OF THE MOON (35,000 N.MI.)
R000162                                   0-OUTSIDE

R000163 ESCPSW         -THE ESCAPE SWITCH: 1-HYPERBOLIC ORBIT
R000164                                    0-ELLIPTIC ORBIT

R000165 SMANGLSW       -SMALL ANGLE SWITCH: 1-SMALL TRANSFER ANGLES
R000166                                     0-LARGE ANGLES (THE USUAL CASE)

R000167 TWO SWITCHES ARE USED INTERNALLY.  THEY ARE ...

R000168 ITERSW         -THE ITERATION SWITCH: 1-FIRST ITERATION IS TO TAKE PLACE
R000169                                       0-SUBSEQUENT ITERATIONS

R00017  PIESW          -THE 180 DEGREES SWITCH: 1-ANGLES GREATER THAN 180 DEGREES WITH TAG5=-0.5
R000172                                         0-ANGLES LESS THAN 180, TAG5=0.5


R000173 DEBRIS ...

R000174   THE LAMBERT ROUTINE INTERNALLY USES SCALING WHICH IS DIFFERENT FROM THAT USED BY THE MAIN PROGRAM.
R000176 INTERNAL TO LAMBERT,
R000177                          7
R000178 LENGTH IS SCALED BY RNORM = 2  RE

R000179 VELOCITY IS SCALED BY VNORM = 2 SQRT(MU/RE)
```

R00018 10 3
R000181 TIME IS SCALED BY TNORM = 2 SQRT(RE /MU)
R000182 WHERE MU IS THE GRAVITATIONAL CONSTANT TIMES THE MASS OF THE EARTH AND RE IS THE RADIUS OF THE EARTH.
R000184 22
R000185 FOR RE, 2 METERS IS USED. HOWEVER, INPUT AND OUTPUT QUANTITIES HAVE SCALING COMPATIBLE WITH THE REST OF THE
R000187 PROGRAM. RESCALING WILL BE DONE BY THE LAMBERT ROUTINE BEFORE COMPUTATIONS BEGIN.

L LAMB USER'S OWN PAGE NO. 4 53 E3

```
00021                          36,2625  40214 1  LAMBERT  SET     SETPD
00022  REF  1                  36,2626  02062 1           ITERSW
000225                         36,2627  00001 0           0D
00023                          36,2630  43014 0           CLEAR   CLEAR
00024  REF  3 LAST  15         36,2631  02265 1           MOONSW
00025  REF  5 LAST 916         36,2632  02261 0           DONESW
00026                          36,2633  43014 0           CLEAR   CLEAR
00027  REF  1                  36,2634  02265 1           SMANGLSW
0003   REF  1                  36,2635  02264 0           PIESW
00034                          36,2636  51145 0           DLOAD   BPL
00035  REF  2 LAST 916         36,2637  03622 1           TAG5
00036                          36,2640  74643 0           +3
00037                          36,2641  77614 1           SET
00038  REF  2 LAST 929         36,2642  02064 1           PIESW
0004                           36,2643  77614 1           BON
00041  REF  3 LAST 912         36,2644  02303 0           GUESSW
00042                          36,2645  74653 1           +6
0005                           36,2646  77745 1           DLOAD
00051  REF  1                  36,2647  35644 1           D1/4
00052  REF  1                  36,2650  01725 0           STORE   TWEEKIT
0006                           36,2651  77650 1           GOTO
00061  REF  1                  36,2652  74656 1           PROG
0007                           36,2653  77745 1           DLOAD
00071  REF  1                  36,2654  35640 0           D1/64
00072  REF  2 LAST 929         36,2655  01725 0           STORE   TWEEKIT
0008                           36,2656  41345 0  PROG     DLOAD   DMP
00081  REF  3 LAST 916         36,2657  02143 0           TFL
00082  REF  1                  36,2660  35670 0           TFACT
00083                          36,2661  77652 0           SL3                RESCALE TIME OF FLIGHT
00084  REF  1                  36,2662  25672 0           STOVL   TF
00085  REF  3 LAST 917         36,2663  03614 1           RCOTEMPV
00086                          36,2664  77702 1           VSR4
00087  REF  1                  36,2665  35707 1           STCALL  ROVEC
00091  REF  1                  36,2666  75112 1           DTPRD
0010                           36,2667  77624 1           CALL
0011   REF  1                  36,2670  75133 1           CGTH
0012                           36,2671  60345 0           DLOAD   NORM
0013                           36,2672  00045 0           36D
0014   REF  8 LAST 879         36,2673  00047 1           X1
0015                           36,2674  53665 1           BDDV    SL*
0016                           36,2675  00041 1           32D
0017                           36,2676  20172 1           0 -7,1
0018                           36,2677  14037 0           STODL   30D        30D=R (+7)

0019   REF  2 LAST 740         36,2700  35646 0           D1/2
0020                           36,2701  70425 0           DSU     SR1
0021                           36,2702  00035 1           28D
0022                           36,2703  00025 0           STORE   20D        20D=1-CSTH (+2) (FOR PCALC IN LOOP)

0023                           36,2704  65301 0           NORM    PDDL       1-CSTH (+2-NI)          PL AT 2D
```

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0024   REF   9 LAST 929     36,2705   00047 1                 X1
0025                        36,2706   00037 0                 30D
0026                        36,2707   77671 1           DDV                                   PL AT 0D
0027                        36,2710   75457 0           SL*   SQRT
0028                        36,2711   20175 0                 0 -4,1
0029                        36,2712   44214 0           BOFF  BDSU
0030   REF   1              36,2713   02345 1                 ESCPSW
0031   REF   1              36,2714   75061 1                 ELTPLMTS
0032                        36,2715   00021 1                 16D
0033                        36,2716   51406 1           PUSH  ABS                                   PL AT 2D
0034                        36,2717   44205 0           DMP   BDSU                                  PL AT 0D
0035   REF   1              36,2720   35656 1                 PERCENT
0036                        36,2721   77626 0           STADR
0037                        36,2722   63744 0           STODL 26D             26D=COGAMX

0038                        36,2723   00031 0                 24D
0039                        36,2724   77742 0           SR1
0040                        36,2725   00023 0           STORE 18D             18D=SIN(TH) (+2) (FOR PCALC IN LOOP)
0041                        36,2726   65301 0           NORM  PDDL            SIN(TH) (+1=N1)       PL AT 2D
0042   REF   10 LAST 930     36,2727   00047 1                 X1
0043                        36,2730   00035 1                 28D
0044                        36,2731   45261 0           SR    DSU
0045                        36,2732   20607 1                 6
0046                        36,2733   00037 0                 30D
0047                        36,2734   00037 0           STORE 30D             30D=COS(TH)-R (+7)  (FOR PCALC IN LOOP)

0048                        36,2735   56214 0           BON   DDV                                   PL AT 0D
0049   REF   3 LAST 929     36,2736   02304 1                 PIESW
0050   REF   1              36,2737   74750 0                 ABSMIN
0051                        36,2740   40057 1           SL*   BOV
0052                        36,2741   20201 0                 0,1
0053   REF   2 LAST 930     36,2742   74750 0                 ABSMIN
0054                        36,2743   51406 1           PUSH  ABS             (CSTH-R)/SNTH (+5)    PL AT 2D
0055                        36,2744   43205 1           DMP   DAD                                   PL AT 0D
0056   REF   2 LAST 930     36,2745   35656 1                 PERCENT
0057                        36,2746   77650 1           GOTO
0058                        36,2747   74753 0                 +4
0059                        36,2750   71201 1 ABSMIN    SETPD DLOAD                               PL AT 0D
0060                        36,2751   00001 0                 0D
0061   REF   1              36,2752   35666 1                 ABSOLMIN
0062                        36,2753   00027 1           STORE 22D             22D=COGAMN (+5)
0063                        36,2754   71214 0           BOFF  DLOAD                               PL AT 2D
0064   REF   4 LAST 929     36,2755   02343 1                 GUESSW
0065   REF   1              36,2756   75041 0                 FIRSTCOG
0066   REF   1              36,2757   01674 0                 COGAVAIL
00661                       36,2760   45214 1           BON   DSU             IF ESCPSW IS OFF, CHECK IF COGAVAIL
006615 REF   2 LAST 930     36,2761   02305 0                 ESCPSW          IS LESS THAN COGAMN
00662  REF   1              36,2762   74774 0                 LOOP
006625                      36,2763   00027 1                 22D
00663                       36,2764   71244 0           BPL   DLOAD
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006635                          36,2765  74772 0                 +5
00664                           36,2766  00027 1                 22D         COGAVAIL IS A BAD GUESS, SO PUT
006645 REF  2 LAST 930          36,2767  01674 0         STORE   COGAVAIL     COGAMN IN COGAVAIL
00665                           36,2770  77650 1         GOTO
006655 REF  2 LAST 930          36,2771  74774 0                 LOOP
00666                           36,2772  77745 1         DLOAD
00667  REF  3 LAST 931          36,2773  01674 0                 COGAVAIL
0067   REF  1                   36,2774  01723 0  LOOP     STORE   INDEP
0068                            36,2775  45205 1         DMP     DSU
0069                            36,2776  00023 0                 18D
0070                            36,2777  00037 0                 30D
0071                            36,3000  55301 0         NORM    BDDV
0072   REF  11 LAST 930         36,3001  00047 1                 X1
0073                            36,3002  00025 0                 20D
0074                            36,3003  40057 1         SL*     BOV
0075                            36,3004  20172 1                 0 -7,1
0076   REF  1                   36,3005  75107 0                 SPEEDY
0077                            36,3006  34043 1  PSTORE  STCALL  34D         34D=P (+2)
0078   REF  1                   36,3007  75146 0                 SMAR
0079                            36,3010  77624 1         CALL
0080   REF  1                   36,3011  75163 1                 TRIGFNS
0081                            36,3012  77624 1         CALL
0082   REF  1                   36,3013  75346 1                 SMA
0083                            36,3014  77624 1         CALL
0084   REF  1                   36,3015  75414 1                 DELTIME
0085   REF  1                   36,3016  01727 1  ZOOM     STORE   DEPVAR
0086                            36,3017  77621 1         BDSU
0087   REF  2 LAST 929          36,3020  01672 0                 TF
0088   REF  1                   36,3021  01733 1         STORE   DELDEP
0089                            36,3022  45246 0         ABS     DSU
0090   REF  1                   36,3023  35672 1                 DEPCRIT
0091                            36,3024  45040 1         BMN     CALL
0092   REF  1                   36,3025  75046 1                 TIMECONV
0093   REF  1                   36,3026  75513 1                 ITERATOR
0094                            36,3027  45246 0         ABS     DSU
0095   REF  1                   36,3030  35650 1                 NEARZERO
0096                            36,3031  71240 1         BMN     DLOAD
0097   REF  1                   36,3032  75056 0                 NOSOL
0098   REF  2 LAST 931          36,3033  01727 1                 DEPVAR
0099   REF  1                   36,3034  15731 0         STODL   PREVDEP
0100   REF  1                   36,3035  01735 1                 DELINDEP
0101                            36,3036  52015 1         DAD     GOTO
0102   REF  2 LAST 931          36,3037  01723 0                 INDEP
0103   REF  3 LAST 931          36,3040  74774 0                 LOOP
0104                            36,3041  65342 1  FIRSTCOG SR1    PDDL                        PL AT 2D
0105                            36,3042  00033 1                 26D
0106                            36,3043  43342 0         SR1     DAD                         PL AT UD
0107                            36,3044  77650 1         GOTO
0108   REF  4 LAST 931          36,3045  74774 0                 LOOP
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 0109                          36,3046   77745 1  TIMECONV DLOAD
 0110   REF   3 LAST 931       36,3047   01723 0                INDEP
 01105  REF   4 LAST 931       36,3050   01674 0           STORE  COGAVAIL
 0111                          36,3051   34023 1           STCALL 18D          18D=COGA (+5)
 0112   REF   1                36,3052   75602 1                INITV
 01121                         36,3053   77414 0           SET    EXIT
 01122  REF   6 LAST 929       36,3054   02061 1                DONESW
 0114   REF 105 LAST 920       36,3055 1 5567 1           TCF    ENDOFJOB
 01141                         36,3056   52014 0  NOSOL    SET    GOTO
 01142  REF   2 LAST 916       36,3057   02060 0                CONVSW
 01143  REF   2 LAST 931       36,3060   75046 1                TIMECONV
 0115                          36,3061   43206 1  ELIPLMTS PUSH   DAD                                  PL AT 2D
 0116                          36,3062   00021 1                16D
 0117                          36,3063   51406 1           PUSH   ABS                                  PL AT 4D
 0118                          36,3064   44205 0           DMP    BDSU                                 PL AT 2D
 0119   REF   3 LAST 930       36,3065   35656 1                PERCENT
 0120                          36,3066   77626 0           STADR
 0121                          36,3067   63744 0           STODL  26D          26D=COGAMX (+5)
 0122                          36,3070   00035 1                28D
 0123                          36,3071   45261 0           SR     DSU
 0124                          36,3072   20607 1                6
 0125                          36,3073   00037 0                30D
 0126                          36,3074   14037 0           STODL  30D          30D=CSTH=R (+7)
 0127                          36,3075   00031 0                24D
 0128                          36,3076   77742 0           SR1
 0129                          36,3077   14023 0           STODL  18D
 0130                          36,3100   00021 1                16D
 0131                          36,3101   41425 1           DSU    PUSH                                 PL AT 0D,2D
 0132                          36,3102   41246 1           ABS    DMP
 0133   REF   4 LAST 932       36,3103   35656 1                PERCENT
 0134                          36,3104   77615 0           DAD                                         PL AT 0D
 0135                          36,3105   77650 1           GOTO
 0136   REF   3 LAST 930       36,3106   74753 0                ABSMIN +3
 0137                          36,3107   52145 0  SPEEDY   DLOAD  GOTO
 0138   REF   2 LAST 740       36,3110   35273 1                DZERO
 0139   REF   1                36,3111   75016 1                ZOOM
R0140   VOVEC (+1) IN MPAC.
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R01401  THIS SECTION CALCULATES THE SINE AND COSINE OF THE ANGLE BETWEEN ROVEC
R01402  AND RIVEC. THE SIGN OF SIN(TH) IS DETERMINED BY TAG5.  THE COSINE OF THE
R01403  ANGLE IS STORED IN 28D WHILE THE SINE IS IN MPAC AS WELL AS IN 24D. BOTH
R01404  ARE SCALED BY  (+2).


R0141   ASSUMES ROVEC (+7) , RIVEC (+7) , TAG5 (+/- ACCORDING TO ANGLE GREATER
R0142   OR LESS THAN 180 DEG) AVAILABLE.
 0143                          36,3112   53575 0  DTPRD    VLOAD   UNIT
 0144   REF   2 LAST 929       36,3113   01707 0            ROVEC
 0145   REF   1                36,3114   15701 0           STODL   UNR1
 0146                          36,3115   00045 0            36D
 0147                          36,3116   24041 1           STOVL   32D              32D=R1 (+7)
 0148   REF   5 LAST 916       36,3117   02365 0            RIVEC
 01485                         36,3120   77702 1           VSR4
 0149                          36,3121   41456 0           UNIT    PUSH             32D=R1 (+7)                    PL AT 6D
 0150                          36,3122   72441 0           DOT     SL1
 0151   REF   2 LAST 933       36,3123   01701 0            UNR1
 0152                          36,3124   24035 1           STOVL   28D              28D=COS(TH) (+1)
 0153   REF   3 LAST 933       36,3125   01701 0            UNR1
 0154                          36,3126   76435 1           VXV     VSL1                                           PL AT 0D
 0155                          36,3127   75246 0           ABVAL   SIGN
 0156   REF   3 LAST 929       36,3130   03622 1                   TAG5
 0157                          36,3131   00031 0           STORE   24D              24D=SIN(TH) (+1)
 0158                          36,3132   77616 0           RVQ

R0159           28D=COS(TH) (+1), 24D=SIN(TH) (+1)=MPAC.
```

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R01591  THIS SECTION COMPUTES COT(TH/2) = (1+COS(TH))/SIN(TH) SCALED BY (+5).
R01592  AND STORES IT IN 16D.  NOTE THAT COT(TH/2) WILL OVERFLOW IF THE ANGLE
R01593  TH IS LESS THAN 3 DEG 35 MINUTES OR GREATER THAN 356 DEG 25 MINUTES.


R0160   ASSUMES SNTH(+1) IN MPAC, 28D=CSTH (+1).
 0161                          36,3133  60254 1  COGTH   BZE     NORM          SNTH (+1=N1)
 01615  REF   1                36,3134  75144 1                  THISP1
 0162   REF  12 LAST 931       36,3135  00047 1                  X1
 0163                          36,3136  70525 1          PDDL    SR1
 0164                          36,3137  00035 1                  28D
 0165                          36,3140  56215 1          DAD     DDV                                  PL AT OD
 0166   REF   2 LAST 929       36,3141  35644 1                  D174
 0167                          36,3142  77657 0          SL*
 0168                          36,3143  20175 0                  0 -4,1
 0169                          36,3144  00021 1  THISP1  STORE   16D
 0170                          36,3145  77616 0          RVQ

R0171           COGTH (+5)=16D.
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R01711  THIS SECTION USES COT(GAMMA),I.E. COGA (+5) AND P (+2) TO CALCULATE R1A
R01712  SCALED BY (+6) AND STORES THE RESULT IN 14D.


R0172   ASSUMES COGA=INDEP (+5), P (+2)=34D.
 0173                          36,3146   63545 0  SMAR      DLOAD   DSQ
 0174   REF   4 LAST 932      36,3147   01723 0                   INDEP
 0175                          36,3150   60215 1           DAD     NORM
 0176   REF   1                36,3151   35636 1                   D1/1024
 0177   REF   13 LAST 934      36,3152   00047 1                   X1
 0178                          36,3153   53605 1           DMP     SR*
 0179                          36,3154   00043 0                   34D
 0180                          36,3155   20573 1                   0 -6,1
 0181                          36,3156   40021 0           BDSU    BOV
 0182   REF   1                36,3157   35642 1                   D1/32
 0183   REF   2 LAST 931      36,3160   75107 0                   SPEEDY
 0184                          36,3161   00017 1  SMARSTOR STORE   14D             14D=R1A (+6)
 0185                          36,3162   77616 0           RVQ


R0186   R1A (+6)=2-P(1+COGA*COGA) IN 14D.
```

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R0187   ASSUMES 16D=COGTH (+5), INDEP=COGA(+5), 34D=P (+2), 14D= R1A (+6).
 0188                        36,3163   45345 1  TRIGFNS  DLOAD   DSU
 0189                        36,3164   00021 1            16D
 0190   REF   5 LAST 935     36,3165   01723 0            INDEP
 0191                        36,3166   00045 0            STORE   36D          36D=DCOT=COT(TH/2)-COGA (+5)

 0192                        36,3167   60316 0            DSQ     NORM
 0193   REF  14 LAST 935     36,3170   00047 1                    X1
 0194                        36,3171   70405 1            DMP     SR1
 0195                        36,3172   00043 0                    34D
 0196                        36,3173   51525 1            PDDL    ABS          DCOT*DCOT (+13-N1)          PL AT 2D
 0197                        36,3174   00017 1                    14D
 0198                        36,3175   55301 0            NORM    BDDV         COGDS (+7-N1+N2)            PL AT 0D
 0199   REF  33 LAST 841     36,3176   00051 0                    S1
 0200                        36,3177   53660 1            XSU,1   SR*
 0201   REF  34 LAST 936     36,3200   00050 1                    S1
 0202                        36,3201   20604 1                    3,1
 0203                        36,3202   77600 1            BOV
 0204   REF   1              36,3203   75343 1                    COGDSOVF
 0205                        36,3204   75206 1  COGDSTOR  PUSH    SIGN         COGDS (+10)
 0206                        36,3205   00017 1                    14D
 0207                        36,3206   60215 1            DAD     NORM
 0208   REF   2 LAST 935     36,3207   35636 1                    D1/1024
 0209   REF  15 LAST 936     36,3210   00047 1                    X1
 0210                        36,3211   65265 0            BDDV    PDDL         2D=1-CSD (-7+N1)            PL AT 4D
 0211   REF   3 LAST 934     36,3212   35644 1                    D1/4
 0212                        36,3213   00001 0                    0D
 0213                        36,3214   60366 1            SQRT    NORM
 0214   REF   4 LAST 786     36,3215   00050 1                    X2
 0215                        36,3216   75205 1            DMP     SIGN
 0216                        36,3217   00003 1                    2D
 0217                        36,3220   00045 0                    36D          SND=+-(1-CSD)SQRT(COGDS) (-2+N1-N2)
 0218                        36,3221   43064 1            XSU,2   BON
 0219   REF  16 LAST 936     36,3222   00046 0                    X1
 0220   REF   3 LAST 930     36,3223   02305 0                    ESCPSW
 0221   REF   1              36,3224   75250 1                    HYPTRIG      DUE TO DIFFERENT SCALING
 0222                        36,3225   65257 1            SR*     PDDL         DXNGE WITH PD,2D=SND (+1)   PL AT 4D
 0223                        36,3226   57173 0                    3,2
 0224                        36,3227   40057 1            SL*     BOV
 0225                        36,3230   20171 1                    0 -8D,1
 0226   REF   1              36,3231   75245 0                    HALFCIRC
 0227                        36,3232   57406 1  COSFN    PUSH    DCOMP        4D=(1-CSD)(+1)              PL AT 6D
 0228                        36,3233   65415 1            DAD     ACOS
 0229   REF   3 LAST 929     36,3234   35646 0                    D1/2
 0230                        36,3235   41365 1            SIGN    DMP
 0231                        36,3236   00045 0                    36D
 0232   REF   3 LAST 915     36,3237   05740 1                    P1/4         CONVERT FROM CIRCLES TO RADIANS/8
 0233                        36,3240   43244 1            BPL     DAD
 0234                        36,3241   75243 0                    +2
 0235   REF   4 LAST 936     36,3242   05740 1                    P1/4
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0236                        36,3243   00001 0          STORE   0D          0D=DELTAE (+3)
0237                        36,3244   77616 0          RVQ
0238                        36,3245   52145 0  HALFCIRC DLOAD   GOTO
0239  REF   1               36,3246   35652 0                   NEAR1
0240  REF   1               36,3247   75232 0                   COSFN
0241                        36,3250   57457 0  HYPTRIG  SR*     DCOMP
0242                        36,3251   57162 0                   12D,2
0243                        36,3252   77725 1          PDDL                 DXNGE WITH PD,2D=SND (+10)   PL AT 4D
0244                        36,3253   41457 1          SL*     PUSH
0245                        36,3254   20160 1                   0 -17D,1    4D=(1-CSD) (+10)             PL AT 6D
0246                        36,3255   43276 0          DCOMP   DAD
0247  REF   3 LAST 936      36,3256   35636 1                   D1/1024
0248                        36,3257   65342 1          SR1     PDDL                                     PL AT 8D
0249                        36,3260   00003 1                   2D
0250                        36,3261   43342 0          SR1     DAD         ARG=COSH(DELG)+SINH(DELG) (+11) PL AT 6D
0251                        36,3262   44301 0          NORM    BDSU        THIS IS AN ARCSINH ROUTINE
0252  REF   2 LAST 916      36,3263   01676 1                   SPLOC       ARG=.5-ARG (+11-N1)
0253  REF   4 LAST 936      36,3264   35646 0                   D1/2
0254                        36,3265   77776 1          EXIT
0255  REF   7 LAST 416      36,3266   3 4570 1 ARCSINH CA       TEN
0256  REF   3 LAST 937      36,3267   27,675 0         ADS     SPLOC       C(SPLOC)=10-N1
0257  REF   4 LAST 925      36,3270   0 7274 1         TC      POLY
0258                        36,3271   00011 1          DEC     9
0259                        36,3272   00000 1  DZERO   2DEC    .0
C0259                       36,3273   00000 1
0260                        36,3274   00400 0          2DEC    .015625
C0260                       36,3275   00000 1
0261                        36,3276   00400 0          2DEC    .015625
C0261                       36,3277   00000 1
0262                        36,3300   00525 0          2DEC    .020833333
C0262                       36,3301   12525 0
0263                        36,3302   01000 0          2DEC    .03125
C0263                       36,3303   00000 1
0264                        36,3304   01463 1          2DEC    .05
C0264                       36,3305   06315 0
0265                        36,3306   02525 1          2DEC    .083333333
C0265                       36,3307   12525 0
0266                        36,3310   04444 1          2DEC    .14285714
C0266                       36,3311   22222 0
0267                        36,3312   10000 0          2DEC    .25
C0267                       36,3313   00000 1
0268                        36,3314   16161 0          2DEC    .44444444
C0268                       36,3315   30706 0
0269                        36,3316   31463 1          2DEC    .8
C0269                       36,3317   06315 0
0270  REF 261 LAST 925      36,3320   3 7767 0         CAF     ZERO
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```
 0271   REF 382 LAST 925     36,3321  54 146 0          IS      MPAC +2
 0272                        36,3322  0 0006 1          EXTEND
 0273   REF   1              36,3323  3 3660 1          DCA     LN2/128
 0274   REF 383 LAST 938     36,3324  52 145 0          DXCH    MPAC              MPAC,+1 CONTAINS LN2/128
 0275   REF   4 LAST 937     36,3325  53'677 1          DXCH    SPLOC +1          SPLOC+1,+2 CONTAINS LN(1/2-ARGS)/128
 0276   REF   5 LAST 938     36,3326  3 1675 1          CA      SPLOC
 0277   REF  13 LAST 925     36,3327  0 7357 1          IC      SHORTMP
 0278   REF 384 LAST 938     36,3330  52 146 0          DXCH    MPAC +1
 0279   REF 385 LAST 938     36,3331  52 145 0          DXCH    MPAC              MPAC CONTAINS (10-N1)LN2/128
 0280   REF   6 LAST 938     36,3332  53'677 1          DXCH    SPLOC +1          A,L CONTAIN LN(1/2-ARGS)/128
 0281                        36,3333  0 0006 1          EXTEND
 0282                        36,3334  4 0001 1          DCOM
 0283   REF 386 LAST 938     36,3335  20 145 0          DAS     MPAC
 0284   REF 107 LAST 925     36,3336  0 6112 0          TC      INTPRET
 0285                        36,3337    77661 0         SR
 0286                        36,3340    20606 0                 5
 0287                        36,3341    00001 0         STORE   OD                OD=DELG (+12)                   PL AT 6D
 0288                        36,3342    77616 0         RVQ


 0289                        36,3343    52145 0  COGDSOVF DLOAD   GOTO
 0290   REF   1              36,3344    35654 0           BIGNO   BIGNO=NEARONE-DP1/1024
 0291   REF   1              36,3345    75204 0           COGDSTOR
R0292   RETURNS WITH OD=DELE (+3) OR DELG(+12),,2D=SND (+1 OR +10),4D=1-CSD (+1
R0293   OR +10), AND PUSHLOC AT 6D
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L       LAMB                                                    USER'S OWN PAGE NO. 14          S3  E3

R0294   ASSUMES 14D=R1A (+6), 32D= R1 (+7)
 0295                           36,3346   60345 0  SMA     DLOAD   NORM            THIS IS ESSENTIALLY A FLOATING POINT SUB
 0296                           36,3347   00017 1          14D     C(SPLOC+1)=-N1
 0297   REF   7 LAST 938        36,3350   01677 0          SPLOC +1        SPLOC LATER WILL BE STORED IN X1 FOR SHF
 0298                           36,3351   60325 0          PDDL    NORM
 0299                           36,3352   00041 1          32D
 0300   REF   8 LAST 939        36,3353   01676 1          SPLOC           C(SPLOC)=-N2
 0301                           36,3354   56342 1          SR1     DDV
 0302                           36,3355   77446 1          ABS     EXIT            ABS(R1/R1A) (+2+N1-N2)
 0303   REF   9 LAST 939        36,3356   4 1676 0         CS      SPLOC +1
 0304   REF  10 LAST 939        36,3357   6 1675 1         AD      SPLOC
 0305   REF  11 LAST 939        36,3360   55'675 0         TS      SPLOC
 0306   REF  17 LAST 302        36,3361   54 020 1         TS      CYR
 0307   REF  18 LAST 939        36,3362   3 0020 0         CA      CYR
 0308                           36,3363   6 0000 1         DOUBLE
 0309                           36,3364   54 000 0         DVSK
 0310   REF   1                 36,3365   1 3370 1         TCF     EVEN
 0311   REF 161 LAST 901        36,3366   3 7763 1  ODD    CA      ONE
 0312   REF   1                 36,3367   1 3371 0         TCF     STORETAG
 0313   REF 262 LAST 937        36,3370   3 7767 0  EVEN   CA      ZERO
 0314   REF  12 LAST 939        36,3371   55'676 0  STORETAG TS     SPLOC +1        A TAG TO DESIGNATE ADDITIONAL SHIFTRIGHT
 0315   REF  13 LAST 939        36,3372   27'675 0         ADS     SPLOC           C(SPLOC)=N1-N2+0 OR 1
 0316   REF  14 LAST 939        36,3373   3 1675 1         CA      SPLOC
 0317   REF  23 LAST 598        36,3374   54 021 0         TS      SR
 0318   REF  24 LAST 939        36,3375   6 0021 1         AD      SR
 0319   REF  15 LAST 939        36,3376   55'675 0         TS      SPLOC           C(SPLOC)=3(N1-N2+0 OR 1)/2
 0320   REF 108 LAST 938        36,3377   0 6112 0         TC      INTPRET
 0321                           36,3400    53740 1         LXC,1   SR*
 0322   REF  16 LAST 939        36,3401   01676 1          SPLOC +1
 0323                           36,3402   20601 1          0,1
 0324                           36,3403   73006 0          PUSH    LXA,2           ABS(R1/R1A) (+2+N1-N2+0 OR 1)  PL DOWN 2
 0325   REF  17 LAST 939        36,3404   01675 1          SPLOC           C(X2)=+3(N1-N2+0 OR 1)/2
 0326                           36,3405   41366 1          SQRT    DMP             ARG TO THE 3/2 POWER,SCALED +3+(3/2)(N1
R0327                                                                   -N2 +0 OR 1)                    PL UP 2
 0329                           36,3406   41214 0          BOFF    DMP
 0330   REF   4 LAST 929        36,3407   02345 1                  MOONSW
 0331                           36,3410   75412 1                  +2
 0332   REF   1                 36,3411   35662 0                  ROOTMU
 0333                           36,3412   00015 0          STORE   12D             12D=SQRT(ABS(R1/R1A))ABS(R1/R1A)
 0334                           36,3413   77616 0          RVQ             SCALED (+3 OR +7)+(3/2)(N1-N2+0 OR 1)
R0335   SMA TO THE 3/2 POWER * ROOTMU IN 12D.
R0336   IF LSW1 SET, INSIDE SPHERE AND 12D SCALED +7+C(X2)
R0337   IF LSW1 OFF, OUTSIDE SPHERE AND 12D SCALED +3+C(X2)
```

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R0338   THIS IS KEPLERS EQUATION FOR TIME-OF-FLIGHT BETWEEN TWO POINTS ON A
R0339   CONIC TRAJECTORY.  IT ASSUMES RIA (+6)=14D, P (+2)=34D, 1=CSD (+1,+10,-2
R0340   =4D, SND (+1,+10,-2)=2D, D (+3,+12,0)=0D.

 0341                          36,3414   41345 0  DELTIME  DLOAD   DMP                                  PL AT 6D
 0342                          36,3415   00043 0           34D
 0343                          36,3416   00017 1           14D
 0344                          36,3417   40061 1           SL      BOV
 0345                          36,3420   20207 0           6
 0346   REF   3 LAST 935       36,3421   75107 0           SPEEDY
 0347                          36,3422   75446 0           ABS     SQRT
 0348                          36,3423   77605 1           DMP                                  PL AT 4D
 0349                          36,3424   72205 0           DMP     TLOAD
 0350   REF   6 LAST 936       36,3425   01723 0                   INDEP
 0351   REF 387 LAST 938       36,3426   00145 1                   MPAC          CHANGES MODE TO TP (00001).
 0352                          36,3427   45325 1           PDDL    DSU           SQRT(P ABS(R1A))(1-CSD)COGA (+7 OR 16)
 0353                          36,3430   00017 1                   14D                                  PL AT 7D
 0354   REF   2 LAST 929       36,3431   35640 0                   D1/64
 0355                          36,3432   77605 1           DMP
 0356                          36,3433   00003 1                   2D
 0357                          36,3434   65351 0           TLOAD   PDDL          (R1A-1)SND (+7 OR16)
 0358   REF 388 LAST 940       36,3435   00145 1                   MPAC          CHANGES MODE TO TP                   PL AT 10D
 0359                          36,3436   00001 0                   0D
 0360                          36,3437   76202 0           SR4     TAD           PL PUSHES UP 3 SINCE TAD GOVERNS INSTEAD
 0361                          36,3440   77771 0           TAD                   OF MODE. MODE REMAINS DP.            PL AT 7D,4D
 0362                          36,3441   75301 1           NORM    SIGN
 0363   REF  17 LAST 936       36,3442   00047 1                   X1
 0364                          36,3443   00017 1                   14D
 0365                          36,3444   56005 1           DMP     XAD,1         T (+(3 OR 7)+C(X2)+(7 OR 16)+C(X1))
 0366                          36,3445   00015 0                   12D
 0367   REF   5 LAST 936       36,3446   00047 1                   X2
 0368                          36,3447   77614 1           BON
 0369   REF   2 LAST 929       36,3450   02305 0                   SMANGLSW
 0370   REF   1                36,3451   75502 1                   THETASM
 0371                          36,3452   43014 0           BOFF    BOFF
 0372   REF   5 LAST 939       36,3453   02345 1                   MOONSW
 0373   REF   1                36,3454   75465 1                   NEARERTH
 0374   REF   4 LAST 936       36,3455   02345 1                   ESCPSW
 0375                          36,3456   75462 0                   +4
 0376                          36,3457   52057 1           SR*     GOTO
 0377                          36,3460   20564 1                   0 -13D,1
 0378   REF   1                36,3461   75475 0                   TMESTORE
 0379                          36,3462   52057 1           SR*     GOTO
 0380                          36,3463   20575 1                   0 -4,1
 0381   REF   2 LAST 940       36,3464   75475 0                   TMESTORE
 0382                          36,3465   53614 1  NEARERTH BOFF    SR*
 0383   REF   5 LAST 940       36,3466   02345 1                   ESCPSW
 0384                          36,3467   75473 0                   +4
 0385                          36,3470   20570 1                   0 -9D,1
 0386                          36,3471   77650 1           GOTO
```

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```
0387  REF  3 LAST 940    36,3472  75475 0                 TMESTORE
0388                     36,3473  77657 0          SR*
0389                     36,3474  20601 1                  0,1
0390                     36,3475  77600 1  TMESTORE BOV
0391  REF  1             36,3476  75510 1                 TIMELONG
0392                     36,3477  00015 0          STORE   12D          12D=T (+10)
0393                     36,3500  43401 0          SETPD   RVQ
0394                     36,3501  00001 0                  0D

0395                     36,3502  42414 0  THETASM  BOFF   SL4          T (+7 +C(X1))
0396  REF  2 LAST 929    36,3503  02342 0                  ITERSW
0397  REF  1             36,3504  75505 0                 ERTHSFER
0398                     36,3505  52057 1  ERTHSFER SR*    GOTO
0399                     36,3506  20604 1                  3,1
0400  REF  4 LAST 941    36,3507  75475 0                 TMESTORE

0401                     36,3510  52145 0  TIMELONG DLOAD  GOTO
0402  REF  2 LAST 937    36,3511  35652 0                  NEAR1
0403  REF  5 LAST 941    36,3512  75477 1                 TMESTORE +2
```

R0404 T (+10) IN 12D AND IN MPAC.

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```
R0405   THIS IS A GENERAL NEWTON ITERATOR WHEREIN A STARTING INDEPENDENT VARIABL
R0406   IS INPUT AND THE CHANGE IN THE INDEPENDENT VARIABLE IS OUTPUT.  THE
R0407   BOUNDS OF THE INDEPENDENT VARIABLE,MAXINDEP AND MININDEP, MUST BE AVAILA
R0408   BLE AND SWITCH 7 MUST BE SET.  IF A GOOD GUESS TO INDEP IS KNOWN,
R0409   TWEEKIT SHOULD BE SET TO A SMALL FRACTION,DEPENDING ON HOW WELL INDEP IS
R0410   KNOWN.  OTHERWISE THE FIRST GUESS TO INDEP SHOULD BE .5(MAXINDEP+MININ-
R0411   DEP) AND TWEEKIT SHOULD BE SET TO .25. IT IS ASSUMED THAT THE CRITERIA
R0412   FOR EXITING FROM THE CALLING PROGRAMS LOOP IS IN THE CALLING PROGRAM.
R0413   THE DEPENDENT VARIABLE MUST BE IN DEPVAR AND THE PREVIOUS ONE MUST BE IN
R0414   PREVDEP.  THE SIGN OF TWEEKIT SOULD BE +/- ACCORDING TO WHETHER THE
R0415   SINGLE-VALUED FUNCTION IS MONOTONICLY INCREASING OR DECREASING.


 0416                          36,3513   71214 0  ITERATOR BONCLR  DLOAD
 0417   REF   3 LAST 941      36,3514   02202 0                   ITERSW
 0418   REF   1               36,3515   75544 0                   FRSTTIME
 0419   REF   3 LAST 931      36,3516   01727 1                   DEPVAR
 0420                          36,3517   60225 1           DSU     NORM
 0421   REF   2 LAST 931      36,3520   01731 0                   PREVDEP
 0422   REF  18 LAST 940      36,3521   00047 1                   X1
 0423                          36,3522   70525 1           PDDL    SR1                          PL DOWN 2
 0424   REF   2 LAST 931      36,3523   01733 1                   DELDEP
 0425                          36,3524   77671 1           DDV                                  PL UP 2
 0426                          36,3525   53605 1           DMP     SL*
 0427   REF   2 LAST 931      36,3526   01735 1                   DELINDEP
 0428                          36,3527   20202 0                   1,1
 0429   REF   3 LAST 942      36,3530   01735 1  NEWDELTA STORE   DELINDEP
 0430                          36,3531   71240 1           BMN     DLOAD        NOW MUST CHECK TO SEE IF THIS DELTA CAN
 0431   REF   1               36,3532   75556 0                   MINCHECK     CAUSE THE INDEPENDENT VARIABLE TO EXCEED
 0432   REF   1               36,3533   00033 1                   MAXINDEP     ITS LIMITS.
 0433                          36,3534   45225 0           DSU     DSU
 0434   REF   7 LAST 940      36,3535   01723 0                   INDEP
 0435   REF   4 LAST 942      36,3536   01735 1                   DELINDEP
 0436                          36,3537   50000 1           BOV     BMN
 0437   REF   1               36,3540   75570 1                   XEEDULMT
 0438   REF   2 LAST 942      36,3541   75570 1                   XEEDULMT
 0439                          36,3542   43545 1           DLOAD   RVQ
 0440   REF   5 LAST 942      36,3543   01735 1                   DELINDEP


 0441                          36,3544   41345 0  FRSTTIME DLOAD   DMP
 0442   REF   1               36,3545   00027 1                   MININDEP
 0443   REF   3 LAST 929      36,3546   01725 0                   TWEEKIT      TWEEKIT SHOULD BE SET  .25  IF THE FIRST
C0444                                                              GUESS OF INDEP WAS .5(MAXINDEP+MININDEP)
 0445                          36,3547   41325 0           PDDL    DMP                          DOWN 2D
 0446   REF   2 LAST 942      36,3550   00033 1                   MAXINDEP
 0447   REF   4 LAST 942      36,3551   01725 0                   TWEEKIT
 0448                          36,3552   77625 0           DSU                                  UP 2D
```

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```
0449                          36,3553   52165 1            SIGN   GOTO
0450  REF   3 LAST 942       36,3554   01733 1                   DELDEP
0451  REF   1                 36,3555   75530 0                   NEWDELTA
0452                          36,3556   45345 1  MINCHECK DLOAD   DSU
0453  REF   2 LAST 942       36,3557   00027 1                   MININDEP
0454  REF   8 LAST 942       36,3560   01723 0                   INDEP
0455                          36,3561   40025 1            DSU    BOV
0456  REF   6 LAST 942       36,3562   01735 1                   DELINDEP
0457  REF   1                 36,3563   75575 1                   XEEDLLMT
0458                          36,3564   71244 0            BPL    DLOAD
0459  REF   2 LAST 943       36,3565   75575 1                   XEEDLLMT
0460  REF   7 LAST 943       36,3566   01735 1                   DELINDEP
0461                          36,3567   77616 0            RVQ

0462                          36,3570   45345 1  XEEDULMT DLOAD   DSU
0463  REF   3 LAST 942       36,3571   00033 1                   MAXINDEP
0464  REF   9 LAST 943       36,3572   01723 0                   INDEP
0465  REF   8 LAST 943       36,3573   01735 1            STORE  DELINDEP
0466                          36,3574   77616 0            RVQ

0467                          36,3575   45345 1  XEEDLLMT DLOAD   DSU
0468  REF   3 LAST 943       36,3576   00027 1                   MININDEP
0469  REF  10 LAST 943       36,3577   01723 0                   INDEP
0470  REF   9 LAST 943       36,3600   01735 1            STORE  DELINDEP
0471                          36,3601   77616 0            RVQ
```

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```
R0472   ASSUMES 32D=R (+7), 34D=P (+2), TAG5 (+/-), 18D=COGA (+5), UNR1 (+1), R2
R0473   VEC (+7) AVAILABLE.
 0474                          36,3602   60345 0  INITV   DLOAD   NORM
 0475                          36,3603   00041 1           32D
 0476   REF  19 LAST 942       36,3604   00047 1           X1
 0477                          36,3605   70525 1           PDDL    SR1         R1 (+7=N1)                  PL AT 2D
 0478                          36,3606   00043 0           34D
 0479                          36,3607   77671 1           DDV                 P/R1 (=4+N1)                PL AT 0D
 0480                          36,3610   41214 0           BOFF    DMP
 0481   REF   6 LAST 940      36,3611   02345 1           MOONSW
 0482   REF   1               36,3612   75617 0           OUTSIDE
 0483   REF   1               36,3613   35664 0           MU
 0484                          36,3614   52057 1           SL*     GOTO
 0485                          36,3615   20165 1                   0 -12D,1
 0486   REF   1               36,3616   75621 0           MAGVTAN
 0487                          36,3617   77657 0  OUTSIDE  SL*
 0488                          36,3620   20173 0                   0 -6,1
 0489                          36,3621   63366 1  MAGVTAN  SQRT    PDVL        V SIN(GAMMA) (+1)           PL AT 2D

 0490   REF   4 LAST 933      36,3622   01701 0           UNR1
 0491                          36,3623   63361 0           VXSC    PDVL        2D=COGA UNR1 (+6)           PL AT 8D
 0492                          36,3624   00023 0                   18D
 0493   REF   2 LAST 924      36,3625   01715 0           UNNORM
 0494                          36,3626   60435 0           VXV     V5R4        UNVTAN (+6)
 0495   REF   5 LAST 944      36,3627   01701 0           UNR1
 0496                          36,3630   74255 0           VAD     VXSC                                    PL AT 2D,0D
 04963                         36,3631   46561 1           VXSC    VSL7
 04964  REF   1               36,3632   35670 0                   VFACT       SCALE FOR ASCENT STEERING AT +7
 04965  REF   2 LAST 916      36,3633   02324 0           STORE   VOVEC
 0497                          36,3634   77616 0           RVQ

R0498   RETURNS WITH VELOCITY IN MPAC AND IN VOVEC SCALED (+1)
```

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 0536                          36,3635   00020 0  D1/1024   2DEC    .5 B-9
C0536                          36,3636   00000 1
 0539                          36,3637   00400 0  D1/64     2DEC    .5 B-5
C0539                          36,3640   00000 1
 0540                          36,3641   01000 0  D1/32     2DEC    .5 B-4
C0540                          36,3642   00000 1
 0543                          36,3643   10000 0  D1/4      2DEC    .5 B-1
C0543                          36,3644   00000 1
 0544                          36,3645   20000 0  D1/2      2DEC    .5
C0544                          36,3646   00000 1
 0545                          36,3647   00000 1  NEARZERO  2OCT    B0
C0545                          36,3650   00001 0
 0547                          36,3651   37777 1  NEARI     2OCT    3777737777
C0547                          36,3652   37777 1
 0548                          36,3653   37757 0  BIGNO     2OCT    3775737777
C0548                          36,3654   37777 1
 0549                          36,3655   00020 0  PERCENT   2DEC    E-3
C0549                          36,3656   14223 1
 0553                          36,3657   00130 0  LN2/128   2DEC    .693147181 B-7
C0553                          36,3660   27103 0
 0559                          36,3661   22031 0  ROOTMU    2DEC    9.0249769 B-4
C0559                          36,3662   22343 0
 0560                          36,3663   31111 1  MU        2DEC    .0122774395 B+6
C0560                          36,3664   32405 1
 0561                          36,3665   40010 1  ABSOLMIN  2DEC    -.999511590
C0561                          36,3666   40042 0
 05611                         36,3667   30276 1  VFACT     2DEC    .761606218
C05611                         36,3670   05000 1
 05612  REF   2 LAST 944              36,3667   TFACT     EQUALS VFACT
 05613                         36,3671   00000 1  DEPCRIT   2DEC    1.135 E-7       50 MS, SCALED BY TNORM
C05613                         36,3672   00036 1
```

L SUM CHECK END OF BANK MARKERS USER'S OWN PAGE NO. 1 53

0001	35 WORDS LEFT	00,3734	03734 1		BNKSUM 00
C0001		00,3735	03735 0		
0002	68 WORDS LEFT	01,3673	03673 0		BNKSUM 01
C0002		01,3674	03674 1		
0003	20 WORDS LEFT	5753	05753 0		BNKSUM 02
C0003		5754	05754 1		
0004	5 WORDS LEFT	7772	07772 1		BNKSUM 03
C0004		7773	07773 0		
0005	145 WORDS LEFT	04,3556	03556 1		BNKSUM 04
C0005		04,3557	03557 0		
0006	171 WORDS LEFT	05,3524	03524 1		BNKSUM 05
C0006		05,3525	03525 0		
0007	180 WORDS LEFT	06,3513	03513 0		BNKSUM 06
C0007		06,3514	03514 1		
0008	17 WORDS LEFT	07,3756	03756 0		BNKSUM 07
C0008		07,3757	03757 1		
0009	281 WORDS LEFT	10,3346	03346 0		BNKSUM 10
C0009		10,3347	03347 1		
0010	301 WORDS LEFT	11,3322	03322 1		BNKSUM 11
C0010		11,3323	03323 0		
0011	107 WORDS LEFT	12,3624	03624 1		BNKSUM 12
C0011		12,3625	03625 0		
0012	115 WORDS LEFT	13,3614	03614 1		BNKSUM 13
C0012		13,3615	03615 0		
0013	21 WORDS LEFT	14,3752	03752 1		BNKSUM 14
C0013		14,3753	03753 0		
0014	42 WORDS LEFT	15,3725	03725 1		BNKSUM 15
C0014		15,3726	03726 1		
0015	13 WORDS LEFT	16,3762	03762 1		BNKSUM 16
C0015		16,3763	03763 0		
0016	8 WORDS LEFT	17,3767	03767 1		BNKSUM 17
C0016		17,3770	03770 1		
0018	2 WORDS LEFT	20,3775	03775 1		BNKSUM 20
C0018		20,3776	03776 1		
0019	6 WORDS LEFT	21,3771	03771 0		BNKSUM 21
C0019		21,3772	03772 0		
0020	29 WORDS LEFT	22,3742	03742 0		BNKSUM 22
C0020		22,3743	03743 1		
0021	268 WORDS LEFT	23,3363	03363 1		BNKSUM 23
C0021		23,3364	03364 0		
0022	27 WORDS LEFT	24,3744	03744 0		BNKSUM 24
C0022		24,3745	03745 1		
0023	489 WORDS LEFT	25,3026	03026 0		BNKSUM 25
C0023		25,3027	03027 1		
00232	386 WORDS LEFT	26,3175	03175 1		BNKSUM 26
C00232		26,3176	03176 1		
00235	120 WORDS LEFT	27,3607	03607 0		BNKSUM 27
C00235		27,3610	03610 0		
0024	6 WORDS LEFT	30,3771	03771 0		BNKSUM 30
C0024		30,3772	03772 0		

L SUM CHECK END OF BANK MARKERS USER'S OWN PAGE NO. 2 53

0025	752 WORDS LEFT	31,2417	02417 1	BNKSUM 31
C0025		31,2420	02420 0	
0026	423 WORDS LEFT	32,3130	03130 0	BNKSUM 32
C0026		32,3131	03131 1	
0027	173 WORDS LEFT	33,3522	03522 1	BNKSUM 33
C0027		33,3523	03523 0	
0028	16 WORDS LEFT	34,3757	03757 1	BNKSUM 34
C0028		34,3760	03760 0	
0029	119 WORDS LEFT	35,3610	03610 0	BNKSUM 35
C0029		35,3611	03611 1	
0030	68 WORDS LEFT	36,3673	03673 0	BNKSUM 36
C0030		36,3674	03674 1	
0031	27 WORDS LEFT	37,3744	03744 0	BNKSUM 37
C0031		37,3745	03745 1	
0032			NO NEED	BNKSUM 40
0033			NO NEED	BNKSUM 41
0034			NO NEED	BNKSUM 42
0035			NO NEED	BNKSUM 43

L INTER-BANK COMMUNICATION USER'S OWN PAGE NO. 1 S3

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R0001           THE FOLLOWING ROUTINE CAN BE USED TO CALL A SUBROUTINE IN ANOTHER BANK. IN THE BANKCALL VERSION, THE
R0003   CADR OF THE SUBROUTINE IMMEDIATELY FOLLOWS THE  TC BANKCALL  INSTRUCTION, WITH C(A) AND C(L) PRESERVED.

 0005                                    5206                BLOCK   02
 0006   REF   6 LAST 289        5206   52 124 1  BANKCALL  DXCH    BUF2          SAVE INCOMING A,L.
 0007   REF 249 LAST 922        5207   50 002 0            INDEX   Q             PICK UP CADR.
 0008                           5210   3 0000 1  BNKCAL+2  CA      0
 0009   REF 250 LAST 948        5211   24 002 0            INCR    Q             SO WE RETURN TO THE LOC. AFTER THE CADR.

R0010           SWCALL IS IDENTICAL TO BANKCALL, EXCEPT THAT THE CADR ARRIVES IN A.

 0012   REF 161 LAST 890        5212   54 001 1  SWCALL    TS      L
 0013   REF   4 LAST 307        5213   22 004 0            LXCH    FBANK         SWITCH BANKS, SAVING RETURN.
 0014   REF   5 LAST 338        5214   7 5337 1            MASK    LOW10         GET SUB-ADDRESS OF CADR.
 0015   REF 251 LAST 948        5215   56 002 0            XCH     Q             A,L NOW CONTAINS DP RETURN.
 0016   REF   7 LAST 948        5216   52 124 1            DXCH    BUF2          RESTORING INPUTS IF THIS IS A BANKCALL.
 0017   REF 252 LAST 948        5217   50 002 0            INDEX   Q
 0018                           5220   0 2000 0            TC      10000         SETTING Q TO SWRETURN.

 0019   REF   8 LAST 948        5221   56 124 0  SWRETURN  XCH     BUF2 +1       COMES HERE TO RETURN TO CALLER. C(A,L)
 0020   REF   5 LAST 948        5222   56 004 0            XCH     FBANK         ARE PRESERVED FOR RETURN.
 0021   REF   9 LAST 948        5223   56 124 0            XCH     BUF2 +1
 0022   REF  10 LAST 948        5224   0 0123 1            TC      BUF2


R0023           THE FOLLOWING ROUTINE CAN BE USED AS A UNILATERAL JUMP WITH C(A,L) PRESERVED AND THE CADR IMMEDIATELY
R0025   FOLLOWING THE TC POSTJUMP INSTRUCTION.

 0026   REF 253 LAST 948        5225   56 002 0  POSTJUMP  XCH     Q             SAVE INCOMING C(A).
 0027   REF 312 LAST 866        5226   50 000 1            INDEX   A             GET CADR.
 0028                           5227   3 0000 1            CA      0

R0029           BANKJUMP IS THE SAME AS POSTJUMP, EXCEPT THAT THE CADR ARRIVES IN A.

 0031   REF   6 LAST 948        5230   54 004 1  BANKJUMP  TS      FBANK
 0032   REF   6 LAST 948        5231   7 5337 1            MASK    LOW10
 0033   REF 254 LAST 948        5232   56 002 0            XCH     Q             RESTORING INPUT C(A) IF THIS WAS A
 0034   REF 255 LAST 948        5233   50 002 0  Q+10000   INDEX   Q             POSTJUMP.
 0035                           5234   1 2000 1  BNKJUP+4  TCF     10000
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L INTER-BANK COMMUNICATION USER'S OWN PAGE NO. 2 S3

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P0036           THE FOLLOWING ROUTINE GETS THE RETURN CADR SAVED BY SWCALL OR BANKCALL AND LEAVES IT IN A.

 0038  REF   7 LAST 948    5235  3 5337 0  MAKECADR CAF    LOW10
 0039  REF  11 LAST 948    5236  7 0123 0           MASK   BUF2
 0040  REF  12 LAST 949    5237  6 0124 0           AD     BUF2 +1
 0041  REF 256 LAST 948    5240  0 0002 0           IC     Q


R0042           THE FOLLOWING ROUTINE OBTAINS THE ONE WORD AT THE ADDRESS ARRIVING IN A, AND LEAVES IT IN A.  ENTER
R0043  WITH THE CADR IN A, AT DATACALL WITH JUNK IN L IF NOT SWITCHING SUPERBANKS, OTHERWISE AT SUPDACAL WITH SUPERBANK
R0044  BITS IN BITS 7-5 IN L (BITS 15-8 AND 4-1 MAY BE JUNK).  DEBRIS = MTEMP.  INHINTS FOR ABOUT 165 MUSEC.

 0045  REF 162 LAST 948    5241  54 001 1  DATACALL TS     L              SAVE CADR (SOLE INPUT HERE).
 00454                     5242  0 0006 1           EXTEND
 00455  REF   1            5243  00 007 0           READ   SUPERBNK       THIS PROLOGUE MAKES SUPERSWITCH VACUOUS.
 0046  REF 163 LAST 949    5244  56 001 0           XCH    L              CADR IN A, SUPERBITS IN L.

 00465  REF   2 LAST  20    5245  54 125 0  SUPDACAL TS     MPTEMP
 0047  REF   7 LAST 948    5246  56 004 0           XCH    FBANK          SET FBANK FOR DATA.
 00475                     5247  0 0006 1           EXTEND
 0048  REF   2 LAST 949    5250  04 007 1           ROR    SUPERBNK       SAVE FBANK IN BITS 15-11, AND
 00485  REF   3 LAST 949    5251  56 125 1           XCH    MPTEMP          SUPERBANK IN BITS 7-5.
 0049  REF   8 LAST 949    5252  7 5337 1           MASK   LOW10
 00495  REF 164 LAST 949    5253  56 001 0           XCH    L              SAVE REL. ADR. IN BANK, FETCH SUPERBITS.
 0050                      5254  0 0004 0           INHINT                BECAUSE RUPT DOES NOT SAVE SUPERBANK.
 00505                     5255  0 0006 1           EXTEND
 0051  REF   3 LAST 949    5256  01 007 1           WRITE  SUPERBNK       SET SUPERBANK FOR DATA.
 0052  REF 165 LAST 949    5257  50 001 0           INDEX  L
 00525                     5260  3 2000 0           CA     10000

 0053  REF   4 LAST 949    5261  56 125 1           XCH    MPTEMP         SAVE 1ST WD, FETCH OLD FBANK AND SBANK.
 00534                     5262  0 0006 1           EXTEND
 00535  REF   4 LAST 949    5263  01 007 1           WRITE  SUPERBNK       RESTORE SUPERBANK.
 0054                      5264  0 0003 1           RELINT
 00545  REF   8 LAST 949    5265  54 004 1           TS     FBANK          RESTORE FBANK.
 0055  REF   5 LAST 949    5266  3 0125 1           CA     MPTEMP         RECOVER FIRST WORD OF DATA.
 00555                     5267  0 0002 0           RETURN                24 WDS. DATACALL 516 MU, SUPDACAL 432 MU
```

L INTER-BANK COMMUNICATION USER'S OWN PAGE NO. 3 S3

P0056 THE FOLLOWING ROUTINES ARE IDENTICAL TO BANKCALL AND SWCALL EXCEPT THAT THEY ARE USED IN INTERRUPT.

```
0058   REF  25 LAST 523      5270  52 073 1  IBNKCALL DXCH   RUPTREG3       USES RUPTREG3,4 FOR DP RETURN ADDRESS.
0059   REF 257 LAST 949      5271  50 002 0           INDEX  Q
0060                         5272  3 0000 1           CAF    0
0061   REF 258 LAST 950      5273  24 002 0           INCR   Q

0062   REF 166 LAST 949      5274  54 001 1  ISWCALL  TS     L
0063   REF   9 LAST 949      5275  22 004 0           LXCH   FBANK
0064   REF   9 LAST 949      5276  7 5337 1           MASK   LOW10
0065   REF 259 LAST 950      5277  56 002 0           XCH    Q
0066   REF  26 LAST 950      5300  52 073 1           DXCH   RUPTREG3
0067   REF 260 LAST 950      5301  50 002 0           INDEX  Q
0068                         5302  0 2000 0           TC     IOOOO

0069   REF  19 LAST 523      5303  56 073 0  ISWRETRN XCH    RUPTREG4
0070   REF  10 LAST 950      5304  56 004 0           XCH    FBANK
0071   REF  20 LAST 950      5305  56 073 0           XCH    RUPTREG4
0072   REF  27 LAST 950      5306  0 0072 1           TC     RUPTREG3
```

L INTER-BANK COMMUNICATION USER'S OWN PAGE NO. 4 53

```
R0073           THE FOLLOWING SUBROUTINES PROVIDE TO THE BASIC PROGRAMMER ENTRY INTO AND RETURN FROM ANY INTERPRETIVE
R0075   CODING WHICH DOES NOT USE THE ENTERING CONTENTS OF Q AND WHICH RETURNS VIA DANZIG. C(A) AND C(L) ARE SAVED.

R0077   USER'S RESPONSIBILITY TO FILL IN ADVANCE THE APPROPRIATE OPERAND AND ADDRESS REGISTERS USED BY THE
R0079   INTERPRETIVE CODING SUCH AS MPAC, BUF, ADDRWD, ETC.; AND TO CONFIRM THAT THE INTERPRETIVE CODING MEETS THE
R0081   ABOVE RESTRICTIONS WITH RESPECT TO Q AND DANZIG.

R0082   USEPRET AND USPRCADR MUST NOT BE USED IN INTERRUPT.

R0083   1. USEPRET ACCESSES INTERPRETIVE CODING WHICH CAN BE ENTERED WITHOUT CHANGING FBANK.
R0085      THE CALLING SEQUENCE IS AS FOLLOWS:

A0086                                       L       TC      USEPRET
A0087                                       L+1     TC,TCF  INTPRETX        TC,TCF MEANS TC OR TCF
A0088                                                                       INTPRETX IS THE INTERPRETIVE CODING
A0089                                                                       RETURN IS TO L+2

R0090   2. USPRCADR ACCESSES INTERPRETIVE CODING IN OTHER THAN THE USER'S FBANK. THE CALLING SEQUENCE IS AS FOLLOWS:

A0092                                       L       TC      USPRCADR
A0093                                       L+1     CADR    INTPRETX        INTPRETX IS THE INTERPRETIVE CODING
A0094                                                                       RETURN IS TO L+2

0095  REF 261 LAST 950      5307  56 002 0  USEPRET  XCH     Q               FETCH Q, SAVING A
0096  REF   6 LAST 291      5310  54 154 0            IS      LOC             L+1 TO LOC
0097  REF  17 LAST 800      5311  3 0006 1            CA      BBANK
0098  REF   1               5312  54 155 1            IS      BANKSET         USER'S BBANK TO BANKSET
0099  REF  32 LAST 922      5313  3 7754 0            CA      BIT8
0100  REF   1               5314  54 023 1            IS      EDOP            EXIT INSTRUCTION TO EDOP
0101  REF 262 LAST 951      5315  3 0002 0            CA      Q               RETRIEVE ORIGINAL A
0102  REF   7 LAST 951      5316  0 0154 1            TC      LOC

0103  REF   8 LAST 951      5317  54 154 0  USPRCADR  IS      LOC             SAVE A
0104  REF  33 LAST 951      5320  3 7754 0            CA      BIT8
0105  REF   2 LAST 951      5321  54 023 1            IS      EDOP            EXIT INSTRUCTION TO EDOP
0106  REF  18 LAST 951      5322  3 0006 1            CA      BBANK
0107  REF   2 LAST 951      5323  54 155 1            IS      BANKSET         USER'S BBANK TO BANKSET
0108  REF 263 LAST 951      5324  50 002 0            INDEX   Q
0109                        5325  3 0000 1            CA      0
0110  REF  11 LAST 950      5326  54 004 1            IS      FBANK           INTERPRETIVE BANK TO FBANK
0111  REF  10 LAST 950      5327  7 5337 1            MASK    LOW10           YIELDS INTERPRETIVE RELATIVE ADDRESS
0112  REF 264 LAST 951      5330  56 002 0            XCH     Q               INTERPRETIVE ADDRESS TO Q, FETCHING L+1
0113  REF   9 LAST 951      5331  56 154 1            XCH     LOC             L+1 TO LOC, RETRIEVING ORIGINAL A
0114  REF   1               5332  1 5233 1            TCF     Q+10000
```

```
L       INTER-BANK COMMUNICATION                                        USER'S OWN PAGE NO.  5          S3

P0117   THERE ARE FOUR POSSIBLE SETTINGS FOR CHANNEL 07. (CHANNEL 07 CONTAINS THE SUPERBANK SETTING.)
R0119
R0120   SUPERBANK       SETTING     S-REG. VALUE      PSEUDO-FIXED      OCTAL PSEUDO
R0121   ---------       -------     ------------      ------------      ------------

R0122   SUPERBANK 3       0XX       2000 - 3777         30 - 37         70000 - 107777   (WHERE XX CAN BE ANYTHING AND
R0124                                                                                   WILL USUALLY BE SEEN AS 11)
R0126   SUPERBANK 4       100       2000 - 3777         40 - 47         110000 - 127777  (AS FAR AS IT CAN BE SEEN,
R0128                                                                                   ONLY BANKS 40-43 WILL EVER BE
R0130                                                                                   AND ARE PRESENTLY AVAILABLE)
R0132   SUPERBANK 5       101       2000 - 3777         50 - 57         130000 - 147777  (PRESENTLY NOT AVAILABLE TO
R0134                                                                                   THE USER)
R0136   SUPERBANK 6       110       2000 - 3777         60 - 67         150000 - 167777  (PRESENTLY NOT AVAILABLE TO
R0138                                                                                   THE USER)
R0142   ***  THIS ROUTINE MAYBE CALLED BY ANY PROGRAM LOCATED IN BANKS 00 - 27.  I.E., NO PROGRAM LIVING IN ANY
R0144   SUPERBANK SHOULD USE SUPERSW.  ***

R0145   SUPERSW MAYBE CALLED IN THIS FASHION:

R0146           CAF     ABBCON          WHERE  --  ABBCON   BBCON  SOMETHIN  --
R0147           TCR     SUPERSW         (THE SUPERBNK BITS ARE IN THE BBCON)
R0148           ...     ...
R0149           .       .
R0150           .       .

R0151   OR IN THIS FASHION ;

R0152           CAF     SUPERSET        WHERE SUPERSET IS ONE OF THE FOUR AVAILABLE
R0154           TCR     SUPERSW         SUPERBANK BIT CONSTANTS:
R0155           ...     ...                                     SUPER011 OCTAL  60
R0157           .       .                                       SUPER100 OCTAL 100
R0159           .       .                                       SUPER101 OCTAL 120
R0161                                                           SUPER110 OCTAL 140

 0163                           5333  0 0006 1  SUPERSW  EXTEND
 0164   REF   5 LAST 949       5334  01 007 1            WRITE   SUPERBNK        WRITE BITS 7-6-5 OF THE ACCUMULATOR INTO
A0165                                                                           CHANNEL 07
 0166   REF 265 LAST 951       5335  0 0002 0            TC      Q               TC TO INSTRUCTION FOLLOWING
A0167                                                                             TC  SUPERSW
```

L INTERPRETER USER'S OWN PAGE NO. 1 53

R0001 SECTION 1 DISPATCHER

R0002 ENTRY TO THE INTERPRETER. INTPRET SETS LOC TO THE FIRST INSTRUCTION, BANKSET TO THE BBANK OF THE
R0004 OBJECT INTERPRETIVE PROGRAM, AND INTBIT15 TO THE BIT15 CONTENTS OF FBANK. INTERPRETIVE PROGRAMS MAY BE IN
R0006 VIRTUALLY ALL BANKS PRESENT UNDER ANY SUPER-BANK SETTING, WITH THE RESTRICTION THAT PROGRAMS IN HIGH BANKS
R0008 (BIT15 OF FBANK = 1) DO NOT REFER TO LOWBANKS, AND VICE-VERSA. THE INTERPRETER DOES NOT SWITCH SUPERBANKS.
R0010 E-BANK SWITCHING OCCURS WHENEVER GENERAL ERASABLE (100 - 3777) IS ADDRESSED.

```
0012                                    6112            BLOCK  03

0013                                    6112  0 0006 1  INTPRET EXTEND                 SET LOC TO THE WORD FOLLOWING THE TC.
0014  REF  10 LAST 951                   6113  22 154 1          QXCH   LOC

0015  REF  19 LAST 951                   6114  3 0006 1  +2      CA     BBANK          INTERPRETIVE BRANCHES FINISH HERE.
0016  REF   3 LAST 951                   6115  54 155 1          IS     BANKSET
0017  REF  37 LAST 810                   6116  7 7745 1          MASK   BIT15          GET 15TH BIT FOR INDEXABLE ADDRESSES.
0018  REF   5 LAST  19                   6117  54 105 1          IS     INTBIT15

0019  REF   3 LAST 951                   6120  54 023 1          IS     EDOP           MAKE SURE NO INSTRUCTIONS LEFT OVER

0021  REF   1                           6121  1 6134 0          TCF    NEWOPS         PICK UP OP CODE PAIR AND BEGIN.

0022  REF  20 LAST 953                   6122  22 006 1  INTRSM  LXCH   BBANK          RESUME SUSPENDED INTERPRETIVE JOB
0023  REF 109 LAST 939                   6123  1 6114 1          TCF    INTPRET +2
```

L INTERPRETER USER'S OWN PAGE NO. 2 53

P0024 AT THE END OF MOST INSTRUCTIONS, CONTROL IS GIVEN TO DANZIG TO DISPATCH THE NEXT OPERATION.

```
 0026   REF  12 LAST 902        6124  54 153 1  NEWMODE  IS    MODE      PROLOGUE FOR MODE-CHANGING INSTRUCTIONS.

 0027   REF   4 LAST 953        6125  3 0155 0  DANZIG   CA    BANKSET   SET BBANK BEFORE TESTING NEWJOB SO THAT
 0028   REF  21 LAST 953        6126  54 006 0           IS    BBANK     IT MAY BE SAVED DIRECILY BY CHANJOB.

 0029   REF   4 LAST 953        6127  10 023 1  NOIBNKSW CCS   EDOP      SEE IF AN ORDER CODE IS LEFT OVER FROM
 0030   REF   1                 6130  1 6143 0           ICF   OPJUMP    THE LAST PAIR RETRIEVED. IF SO, EXECUTE.
A0031                                                                   EDOP IS SET TO ZERO ON ITS RE-EDITING.

 0032   REF  10 LAST 916        6131  10 067 1           CCS   NEWJOB    SEE IF A JOB OF HIGHER PRIORITY IS
 0033   REF   1                 6132  1 5540 1           ICF   CHANG2    PRESENT, AND IF SO, CHANGE JOBS.

 0034   REF  11 LAST 953        6133  24 154 1           INCR  LOC       ADVANCE THE LOCATION COUNTER.
R00345          ITRACE (1) REFERS TO "NEWOPS".
 0035   REF  12 LAST 954        6134  50 154 1  NEWOPS   INDEX LOC       ENTRY TO BEGIN BY PICKING OP CODE PAIR.
 0036                           6135  3 0000 1           CA    0         MAY BE AN OPCODE PAIR OR A STORE CODE.
 0037   REF 313 LAST 948        6136  10 000 0           CCS   A         TEST SIGN AND GET DABS(A).
 0038   REF   1                 6137  1 6431 0           ICF   DOSTORE   PROCESS STORE CODE.

 0039   REF  48 LAST 813        6140  0 4736 1           IC    CCSHOLE   TO CATCH SOME TASK USERS OF INTERPRETER.

 0040   REF   5 LAST 954        6141  54 023 1           IS    EDOP      OP CODE PAIR. LEAVE THE OTHER IN EDOP
 0041   REF   5 LAST 555        6142  7 5342 0           MASK  LOW7      WHERE  CCS EDOP  WILL HONOR IT NEXT.

 0042   REF  19 LAST 939        6143  54 020 1  OPJUMP   IS    CYR       LOWWD ENTERS HERE IF A RIGHT-HAND OP
 0043   REF  20 LAST 954        6144  10 020 1           CCS   CYR       CODE IS TO BE PROCESSED. TEST PREFICES.
 0044   REF   1                 6145  1 6313 1           ICF   OPJUMP2   TEST SECOND PREFIX BIT.

 0045   REF   1                 6146  1 7021 1           ICF   EXIT      +0 OP CODE IS EXIT.
```

L INTERPRETER USER'S OWN PAGE NO. 3 53

P0046 PROCESS ADDRESSES WHICH MAY BE DIRECT, INDEXED, OR REFERENCE THE PUSHDOWN LIST.

```
0048  REF  62 LAST 819    6147  7 7763 0  ADDRESS  MASK    BIT1     SEE IF ADDRESS IS INDEXED. CYR CONTAINED
0049  REF 314 LAST 954    6150  10 000 0            CCS     A        400XX, SO BIT 1 IS NOW AS IT WAS IN CYR.
0050  REF   1             6151  1 6212 1           TCF     INDEX    FORM INDEXED ADDRESS.

0051  REF  13 LAST 954    6152  50 154 1  DIRADRES INDEX   LOC      LOOK AHEAD TO NEXT WORD TO SEE IF
0052                      6153  4 0001 1  OCT40001 CS      1        ADDRESS IS GIVEN.
0053  REF 315 LAST 955    6154  10 000 0            CCS     A
0054  REF   1             6155  1 6261 0           TCF     PUSHUP   IF NOT.

0055                      6156   77773 1  NEG4     DEC     -4

0056  REF  14 LAST 955    6157  24 154 1           INCR    LOC      IF SO, TO SHOW WE PICKED UP A WORD.
0057  REF   1             6160  54 106 1           TS      ADDRWD
```

L INTERPRETER USER'S OWN PAGE NO. 4 53

```
P0058           FINAL DIGESTION OF DIRECT ADDRESSES OF OP CODES WITH 01 PREFIX IS DONE HERE. IN EACH CASE, THE
R0060   REQUIRED 12-BIT SUB-ADDRESS IS LEFT IN ADDRWD, WITH ANY REQUIRED E OR F BANK SWITCHING DONE. ADDRESSES LESS
R0062   THAN 45D ARE TAKEN TO BE RELATIVE TO THE WORK AREA. THE OP CODE IS NOW IN BITS 1-5 OF CYR WITH BIT 14 = 1.

 0064   REF   1                6161  6 6315 0          AD      -ENDVAC     SEE IF ADDRESS RELATIVE TO WORK AREA.
 0065   REF 316 LAST 955       6162  10 000 0          CCS     A
 0066   REF   1                6163  6 6342 1          AD      -ENDERAS    IF NOT, SEE IF IN GENERAL ERASABLE.
 0067   REF   1                6164  1 6171 1          ICF     IERASTST

 0068   REF  33 LAST 904       6165  3 0110 1  NETZERO CA      FIXLOC      IF SO, LEAVE THE MODIFIED ADDRESS IN
 0069   REF   2 LAST 955       6166  26 106 1          ADS     ADDRWD      ADDRWD AND DISPATCH.
 0070   REF  21 LAST 954       6167  50 020 0  ITR15   INDEX   CYR         THIS INDEX MAKES THE NEXT INSTRUCTION
 0071   REF   1                6170  7 6342 0          7       INDJUMP -1  TCF INDJUMP + OP, EDITING CYR.

 0072                          6171  0 0006 1  IERASTST EXTEND
 0073   REF   1                6172  6 6202 1          DCMF    GEADDR      GO PROCESS GENERAL-ERASABLE ADDRESS.

 0074   REF  11 LAST 951       6173  7 5337 1          MASK    LOW10       FIXED BANK ADDRESS. RESTORE AND ADD B15.
 0075   REF  12 LAST 956       6174  6 5337 0          AD      LOW10       SWITCH BANKS AND LEAVE SUBADDRESS IN
 0076   REF   3 LAST 956       6175  56 106 0          XCH     ADDRWD      ADDRWD FOR OPERAND RETRIEVAL. (THIS
 0077   REF   6 LAST 953       6176  6 0105 0          AD      INTBIT15    METHOD PRECLUDES USE OF THE LAST
 0078   REF  12 LAST 951       6177  54 004 1          IS      FBANK       LOCATION IN EACH FBANK.)
 0079   REF  22 LAST 956       6200  50 020 0  ITR12   INDEX   CYR
 00795  REF   2 LAST 956       6201  7 6342 0          7       INDJUMP -1

 0080   REF  12 LAST 887       6202  7 4564 0  GEADDR  MASK    LOW8
 00802  REF   5 LAST 302       6203  6 5352 0          AD      OCT1400
 00803  REF   4 LAST 956       6204  56 106 0          XCH     ADDRWD
 00804  REF  67 LAST 921       6205  54 003 0          IS      EBANK
 00806  REF  23 LAST 956       6206  50 020 0  ITR10   INDEX   CYR
 00807  REF   3 LAST 956       6207  7 6342 0          7       INDJUMP -1
```

L INTERPRETER USER'S OWN PAGE NO. 5 53

```
P0081           THE FOLLOWING ROUTINE PROCESSES INTERPRETIVE INDEXED ADDRESSES. AN INTERPRETER INDEX REGISTER MAY
R0083   CONTAIN THE ADDRESS OF ANY ERASABLE REGISTER (0-42 BEING RELATIVE TO THE VAC AREA) OR ANY INTERPRETIVE PROGRAM
R0085   BANK, OR ANY INTEGER IN THAT RANGE.

0086    REF   1                 6210  3 5346 0  DODLOAD*  CAF     DLOAD*          STODL* COMES HERE TO PROCESS LOAD ADR.
0087    REF  24 LAST 956        6211  54 020 1            TS      CYR             (STOVL* ENTERS HERE).

0088    REF  34 LAST 956        6212  3 0110 1  INDEX     CA      FIXLOC          SET UP INDEX LOCATION.
0089    REF   1                 6213  54 120 0            TS      INDEXLOC
0090    REF  15 LAST 955        6214  24 154 1            INCR    LOC             (ADDRESS ALWAYS GIVEN).
0091    REF  16 LAST 957        6215  50 154 1            INDEX   LOC
0092                            6216  4 0000 0            CS      0
0093    REF 317 LAST 956        6217  10 000 0            CCS     A               INDEX 2 IF ADDRESS STORED COMPLEMENTED.
0094    REF   2 LAST 957        6220  24 120 1            INCR    INDEXLOC
0095                            6221  1 6222 1            NOOP

0096    REF   5 LAST 956        6222  54 106 1            TS      ADDRWD          14 BIT ADDRESS TO ADDRWD.
0097    REF   1                 6223  7 5351 1            MASK    HIGH4           IF ADDRESS GREATER THAN 2K, ADD INTBIT15
0098                            6224  0 0006 1            EXTEND
0099    REF   1                 6225  1 6230 1            BZF     INDEX2
0100    REF   7 LAST 956        6226  3 0105 0            CA      INTBIT15
0101    REF   6 LAST 957        6227  26 106 1            ADS     ADDRWD

0102    REF   3 LAST 957        6230  50 120 1  INDEX2    INDEX   INDEXLOC
0103    REF  20 LAST 944        6231  4 0046 1            CS      X1
0104    REF   7 LAST 957        6232  26 106 1            ADS     ADDRWD          DO AUGMENT, IGNORING AND CORRECTING OVF.

0105    REF   1                 6233  7 6340 1            MASK    HIGH9           SEE IF ADDRESS IS IN WORK AREA.
0106                            6234  0 0006 1            EXTEND
0107    REF   1                 6235  1 6250 1            BZF     INDWORK
0108    REF   2 LAST 957        6236  7 5351 1            MASK    HIGH4           SEE IF IN FIXED BANK.
0109                            6237  0 0006 1            EXTEND
0110    REF   1                 6240  1 6252 0            BZF     INDERASE

0111    REF   8 LAST 957        6241  3 0106 0            CA      ADDRWD          IN FIXED - SWITCH BANKS AND CREATE
0112    REF  13 LAST 956        6242  54 004 1            TS      FBANK           SUB-ADDRESS.
0113    REF  13 LAST 956        6243  7 5337 1            MASK    LOW10
0114    REF   1                 6244  6 7751 0            AD      2K
0115    REF   9 LAST 957        6245  54 106 1            TS      ADDRWD
0116    REF  25 LAST 957        6246  50 020 0  ITR11     INDEX   CYR
0117    REF   4 LAST 956        6247  3 6342 1            3       INDJUMP -1

0118    REF  35 LAST 957        6250  3 0110 1  INDWORK   CA      FIXLOC          MAKE ADDRWD RELATIVE TO WORK AREA.
0119    REF   1                 6251  1 6256 1            TCF     ITR13 -1

0120    REF   6 LAST 956        6252  3 5352 0  INDERASE  CA      OCT1400
01202   REF  10 LAST 957        6253  56 106 0            XCH     ADDRWD
01204   REF  68 LAST 956        6254  54 003 0            TS      EBANK
01206   REF  13 LAST 956        6255  7 4564 0            MASK    LOW8
0121    REF  11 LAST 957        6256  26 106 1  -1        ADS     ADDRWD
```

L INTERPRETER USER'S OWN PAGE NO. 6 53

```
01212  REF  26 LAST 957      6257  50 020 0  ITR13    INDEX  CYR
01214  REF   5 LAST 957      6260  3 6342 1             3      INDJUMP -1
```

```
R0122           PUSH-UP ROUTINES. WHEN NO OPERAND ADDRESS IS GIVEN, THE APPROPRIATE OPERAND IS TAKEN FROM THE PUSH-DOWN
R0124   LIST. IN MOST CASES THE MODE OF THE RESULT (VECTOR OR SCALAR) OF THE LAST ARITHMETIC OPERATION PERFORMED
R0126   IS THE SAME AS THE TYPE OF OPERAND DESIRED (ALL ADD/SUBTRACT ETC.). EXCEPTIONS TO THIS GENERAL RULE ARE LISTED
R0128   BELOW (NOTE THAT IN EVERY CASE THE MODE REGISTER IS LEFT INTACT):

R0129           1. VXSC AND V/SC WANT THE OPPOSITE TYPE OF OPERAND, E.G., IF THE LAST OPERATION YIELDED A VECTOR
R0131   RESULT, VXSC WANTS A SCALAR.

R0132           2. THE LOAD CODES SHOULD LOAD THE ACCUMULATOR INDEPENDENT OF THE RESULT OF THE LAST OPERATION. THIS
R0134   INCLUDES VLOAD, DLOAD, TLOAD, PDDL, AND PDVL (NO PUSHUP WITH SLOAD).

R0135           3. SOME ARITHMETIC OPERATIONS REQUIRE A STANDARD TYPE OF OPERAND REGARDLESS OF THE PREVIOUS OPERATION.
R0137   THIS INCLUDES SIGN WANTING DP AND TAD REQUIRING TP.

0138  REF   1                  6261  3 4565 0  PUSHUP   CAF     OCT23          IF THE LOW 5 BITS OF CYR ARE LESS THAN
0139  REF  27 LAST 958         6262  7 0020 1            MASK    CYR            20, THIS OP REQUIRES SPECIAL ATTENTION.
0140  REF   1                  6263  6 6266 0            AD      -OCT10         (NO -0).
0141  REF 318 LAST 957         6264  10 000 0            CCS     A
0142  REF   1                  6265  1 6277 1            TCF     REGUP          FOR ALL CODES GREATER THAN OCT 7.

0143                           6266   77767 1  -OCT10   OCT     -10

0144  REF   1                  6267  6 6156 0            AD      NEG4           WE NOW HAVE 7 - OP CODE(MOD4). SEE IF
0145  REF 319 LAST 959         6270  10 000 0            CCS     A              THE OP CODE (MOD4) IS THREE (REVERSE).
0146  REF 320 LAST 959         6271  50 000 1            INDEX   A              NO - THE MODE IS DEFINITE. PICK UP THE
0147  REF   1                  6272  4 6310 1            CS      NO.WDS
0148  REF   2 LAST 959         6273  1 6301 1            TCF     REGUP +2

0149  REF  13 LAST 954         6274  50 153 0            INDEX   MODE           FOR VXSC AND V/SC WE WANT THE REQUIRED
0150  REF   1                  6275  4 6306 0            CS      REVCNT         PUSHLOC DECREMENT WITHOUT CHANGING THE
0151  REF   3 LAST 959         6276  1 6301 1            TCF     REGUP +2       MODE AT THIS TIME.

0152  REF  14 LAST 959         6277  50 153 0  REGUP    INDEX   MODE           MOST ALL OP CODES PUSHUP HERE.
0153  REF   2 LAST 959         6300  4 6310 1            CS      NO.WDS
0154  REF   2 LAST 904         6301  26 156 1  +2       ADS     PUSHLOC
0155  REF  12 LAST 957         6302  54 106 1            TS      ADDRWD
0156  REF  28 LAST 959         6303  50 020 0  ITR14    INDEX   CYR
0157  REF   6 LAST 958         6304  7 6342 0            7       INDJUMP -1     (THE INDEX MAKES THIS A TCF.)

0158                           6305   00002 0            OCT     2              REVERSE PUSHUP DECREMENT. VECTOR TAKES 2
0159                           6306   00006 1  REVCNT   OCT     6              WORDS, SCALAR TAKES 6.
0160                           6307   00006 1            OCT     6
0161                           6310   00002 0  NO.WDS   OCT     2              CONVENTIONAL DECREMENT IS 6 WORDS VECTOR
0162                           6311   00003 1  OCTAL3   OCT     3              2 IN DP, AND 3 IN TP.
0163                           6312   00006 1            OCT     6
```

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P0164 TEST THE SECOND PREFIX BIT TO SEE IF THIS IS A MISCELLANEOUS OR A UNARY/SHORT SHIFT OPERATION.

```
0166  REF  29 LAST 959      6313  10 020 1  OPJUMP2  CCS     CYR          TEST SECOND PREFIX BIT.
0167  REF   1               6314  1 6327 0           TCF     OPJUMP3      TEST THIRD BIT TO SEE IF UNARY OR SHIFT.

0168                        6315   77722 0  -ENDVAC  DEC     -45

R0169          THE FOLLOWING ROUTINE PROCESSES ADDRESSES OF SUFFIX CLASS 10. THEY ARE BASICALLY WORK AREA ADDRESSES
R0171  IN THE RANGE 0 - 52, ERASABLE ECADR CONSTANTS FROM 100 - 3777, AND FCADRS ABOVE THAT. ALL 15 BITS ARE AVAILABLE
R0173  IN CONTRAST TO SUFFIX 1, IN WHICH ONLY THE LOW ORDER 14 ARE AVAILABLE.

0174  REF  17 LAST 957      6316  24 154 1  15BITADR INCR    LOC          (ENTRY HERE FROM STCALL).
0175  REF  18 LAST 960      6317  50 154 1           INDEX   LOC          PICK UP ADDRESS WORD.
0176                        6320  3 0000 1           CA      0
0177  REF   6 LAST  19      6321  54 107 0           TS      POLISH       WE MAY NEED A SUBADDRESS LATER.

0184  REF   1               6322  3 6337 0           CAF     LOW7+2K      THESE INSTRUCTIONS ARE IN BANK 1.
0185  REF  14 LAST 957      6323  54 004 1           TS      FBANK
0186  REF  30 LAST 960      6324  7 0020 1           MASK    CYR
0187  REF 321 LAST 959      6325  50 000 1  ITR7     INDEX   A
0188  REF   1               6326  1 6403 1           TCF     MISCJUMP
```

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P0196 COMPLETE THE DISPATCHING OF UNARY AND SHORT SHIFT OPERATIONS.

```
0197   REF  15 LAST 960      6327  54 004 1  OPJUMP3  IS      FBANK      CALL IN BANK 0 (BITS 11-15 OF A ARE 0.)
R01975          ITRACE (6) REFERS TO "OPJUMP3".
0198   REF  31 LAST 960      6330  10 020 1           CCS     CYR        TEST THIRD PREFIX BIT.
0199   REF 322 LAST 960      6331  50 000 1           INDEX   A          THE DECREMENTED UNARY CODE IS IN BITS
0200   REF   1               6332  1 2000 1           TCF     UNAJUMP    1-4 OF A (ZERO, EXIT, HAS BEEN DETECTED)

0201   REF  15 LAST 959      6333  10 153 1           CCS     MODE       ITS A SHORT SHIFT CODE. SEE IF PRESENT
0202   REF   1               6334  1 2017 1           TCF     SHORTT     SCALAR OR VECTOR.
0203   REF   2 LAST 961      6335  1 2017 1           TCF     SHORTT
0204   REF   1               6336  1 2121 0           TCF     SHORTV     CALLS THE APPROPRIATE ROUTINE.


0205   REF   7 LAST 280                4565  OCT23    =       VD1
0206                         6337  02177 1  LOW7+2K  OCT     2177       OP CODE MASK + BANK 1 FBANK SETTING.
0207                         6340  77700 0  HIGH9    OCT     77700
0208                         6341  76000 0  BANKMASK OCT     76000      FBANK MASK.
0209   REF   1                 6341  FBANKMSK EQUALS  BANKMASK
0210   REF   5 LAST 822        5655  B12T14   =       PRIO34     USED IN PROCESSING STORE CODES.
0211                         6342  74056 1  -ENDERAS DEC     -2001      = -(2047 - 45 - 1)
```

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P0212 THE FOLLOWING IS THE JUMP TABLE FOR OP CODES WHICH MAY HAVE INDEXABLE ADDRESSES OR MAY PUSH UP.

0214	REF	1	6343	1 6563 0	INDJUMP	ICF	VLOAD	00 - LOAD MPAC WITH A VECTOR.
0215	REF	1	6344	1 7142 0		ICF	TAD	01 - TRIPLE PRECISION ADD TO MPAC.
0216	REF	1	6345	1 7707 1		ICF	SIGN	02 - COMPLEMENT MPAC (V OR SC) IF X NEG.
0217	REF	1	6346	1 7460 0		ICF	VXSC	03 - VECTOR TIMES SCALAR.
0218	REF	1	6347	1 6761 0		ICF	CGOTO	04 - COMPUTED GO TO.
0219	REF	2 LAST 654	6350	1 6546 1		ICF	TLOAD	05 - LOAD MPAC WITH TRIPLE PRECISION.
0220	REF	1	6351	1 6537 1		ICF	DLOAD	06 - LOAD MPAC WITH A DP SCALAR.
0221	REF	1	6352	1 7656 1		ICF	V/SC	07 - VECTOR DIVIDED BY SCALAR.
0222	REF	1	6353	1 6557 1		ICF	SLOAD	10 - LOAD MPAC IN SINGLE PRECISION.
0223	REF	1	6354	1 6676 1		ICF	SSP	11 - SET SINGLE PRECISION INTO X.
0224	REF	1	6355	1 6601 1		ICF	PDDL	12 - PUSH DOWN MPAC AND RE-LOAD IN DP.
0225	REF	1	6356	1 7413 1		ICF	MXV	13 - MATRIX POST-MULTIPLIED BY VECTOR.
0226	REF	1	6357	1 6635 0		ICF	PDVL	14 - PUSH DOWN AND VECTOR LOAD.
0227	REF	1	6360	1 6704 0		ICF	CCALL	15 - COMPUTED CALL.
0228	REF	1	6361	1 7416 1		ICF	VXM	16 - MATRIX PRE-MULTIPLIED BY VECTOR.
0229	REF	1	6362	1 7650 1		ICF	TSLC	17 - NORMALIZE MPAC (SCALAR ONLY).
0230	REF	1	6363	1 7626 0		ICF	DMPR	20 - DP MULTIPLY AND ROUND.
0231	REF	1	6364	1 7631 0		ICF	DDV	21 - DP DIVIDE BY.
0232	REF	1	6365	1 7635 1		ICF	BDDV	22 - DP DIVIDE INTO.
0233	REF	1	6366	1 7653 1		ICF	GSHIFT	23 - GENERAL SHIFT INSTRUCTION.
0234	REF	1	6367	1 7025 0		ICF	VAD	24 - VECTOR ADD.
0235	REF	1	6370	1 7053 1		ICF	VSU	25 - VECTOR SUBTRACT.
0236	REF	1	6371	1 7103 0		ICF	BVSU	26 - VECTOR SUBTRACT FROM.
0237	REF	1	6372	1 7410 1		ICF	DOT	27 - VECTOR DOT PRODUCT.
0238	REF	1	6373	1 7540 0		ICF	VXV	30 - VECTOR CROSS PRODUCT.
0239	REF	1	6374	1 7504 0		ICF	VPROJ	31 - VECTOR PROJECTION.
0240	REF	1	6375	1 7071 1		ICF	DSU	32 - DP SUBTRACT.
0241	REF	1	6376	1 7127 0		ICF	BDSU	33 - DP SUBTRACT FROM.
0242	REF	1	6377	1 7043 0		ICF	DAD	34 - DP ADD.
0243			6400	1 6400 1		ICF		35 - AVAILABLE
0244	REF	1	6401	1 7624 1		ICF	DMP1	36 - DP MULTIPLY.
0245	REF	1	6402	1 7645 0		ICF	SETPD	37 - SET PUSH DOWN POINTER (DIRECT ONLY)

R0246 CODES 10 AND 14 MUST NOT PUSH UP. CODE 04 MAY BE USED FOR VECTOR DECLARE BEFORE PUSHUP IF DESIRED.

L INTERPRETER USER'S OWN PAGE NO. 11 53

P0248 THE FOLLOWING JUMP TABLE APPLIES TO INDEX, BRANCH, AND MISCELLANEOUS INSTRUCTIONS.

```
0250  REF  1        6403  1 2626 0  MISCJUMP  ICF  AXT          00 - ADDRESS TO INDEX TRUE.
0251  REF  1        6404  1 2633 1             ICF  AXC          01 - ADDRESS TO INDEX COMPLEMENTED.
0252  REF  1        6405  1 2636 1             ICF  LXA          02 - LOAD INDEX FROM ERASABLE.
0253  REF  1        6406  1 2642 1             ICF  LXC          03 - LOAD INDEX FROM COMPLEMENT OF ERAS.
0254  REF  1        6407  1 2646 0             ICF  SXA          04 - STORE INDEX IN ERASABLE.
0255  REF  1        6410  1 2654 0             ICF  XCHX         05 - EXCHANGE INDEX WITH ERASABLE.
0256  REF  1        6411  1 2670 0             ICF  INCR         06 - INCREMENT INDEX REGISTER.
0257  REF  1        6412  1 2677 1             ICF  TIX          07 - TRANSFER ON INDEX.

0258  REF  1        6413  1 2662 0             ICF  XAD          10 - INDEX REGISTER ADD FROM ERASABLE.
0259  REF  1        6414  1 2673 0             ICF  XSU          11 - INDEX SUBTRACT FROM ERASABLE.
0260  REF  1        6415  1 2751 1             TCF  BZE/GOTO     12 - BRANCH ZERO AND GOTO.
0261  REF  1        6416  1 2756 0             ICF  BPL/BMN      13 - BRANCH PLUS AND BRANCH MINUS.
0262  REF  1        6417  1 2731 1             ICF  RTB/BHIZ     14 - RETURN TO BASIC AND BRANCH HI ZERO.
0263  REF  1        6420  1 2771 0             ICF  CALL/ITA     15 - CALL AND STORE QPRET.
0264  REF  1        6421  1 3000 0             ICF  SW/          16 - SWITCH INSTRUCTIONS AND AVAILABLE.
0265  REF  1        6422  1 2741 0             ICF  BOV(B)       17 - BRANCH ON OVERFLOW TO BASIC OR INT.
```

L INTERPRETER USER'S OWN PAGE NO. 12 53

P0266 THE FOLLOWING JUMP TABLE APPLIES TO UNARY INSTRUCTIONS.

```
0267                                    00,2000                 BANK    0       00 = EXIT - DETECTED EARLIER.
0268  REF   1                 00,2000   1 3167 0  UNAJUMP      TCF     SQRT    01 = SQUARE ROOT.
0269  REF   1                 00,2001   1 3511 0               TCF     SINE    02 = SIN.
0270  REF   1                 00,2002   1 3500 0               TCF     COSINE  03 = COS.
0271  REF   1                 00,2003   1 3571 0               TCF     ARCSIN  04 = ARC SIN.
0272  REF   1                 00,2004   1 3573 1               TCF     ARCCOS  05 = ARC COS.
0273  REF   1                 00,2005   1 3154 0               TCF     DSQ     06 = DP SQUARE.
0274  REF   1                 00,2006   1 2116 1               TCF     ROUND   07 = ROUND TO DP.

0275  REF   1                 00,2007   1 7722 0               TCF     COMP    10 = COMPLEMENT VECTOR OR SCALAR.
0276  REF   1                 00,2010   1 3212 1               TCF     VDEF    11 = VECTOR DEFINE.
0277  REF   1                 00,2011   1 3002 1               TCF     UNIT    12 = UNIT VECTOR.
0278  REF   1                 00,2012   1 3156 1               TCF     ABVALABS 13 = LENGTH OF VECTOR OR MAG OF SCALAR.
0279  REF   1                 00,2013   1 3226 0               TCF     VSQ     14 = SQUARE OF LENGTH OF VECTOR.
0280  REF   1                 00,2014   1 6423 0               TCF     STADR   15 = PUSH UP ON STORE CODE.
0281  REF   1                 00,2015   1 3256 1               TCF     RVQ     16 = RETURN VIA QPRET.
0282  REF   1                 00,2016   1 3231 0               TCF     PUSH    17 = PUSH MPAC DOWN.
```

L INTERPRETER USER'S OWN PAGE NO. 13 S3

P0283 SECTION 2 LOAD AND STORE PACKAGE.

R0284 A SET OF EIGHT STORE CODES IS PROVIDED AS THE PRIMARY METHOD OF STORING THE MULTI-PURPOSE
R0286 ACCUMULATOR (MPAC). IF IN THE DANZIG SECTION LOC REFERS TO AN ALGEBRAICALLY POSITIVE WORD, IT IS TAKEN AS A
R0288 STORE CODE WITH A CORRESPONDING ERASABLE ADDRESS. MOST OF THESE CODES ARE TWO ADDRESS, SPECIFYING THAT THE WORD
R0290 FOLLOWING THE STORE CODE IS TO BE USED AS AN ADDRESS FROM WHICH TO RE-LOAD MPAC. FOUR OPTIONS ARE AVAILABLE:

R0292 1. STORE STORE MPAC. THE E ADDRESS MAY BE INDEXED.
R0294 2. STODL STORE MPAC AND RE-LOAD IT IN DP WITH THE NEXT ADDRESS (THE LOAD MAY BE INDEXED).
R0296 3. STOVL STORE MPAC AND RE-LOAD A VECTOR (AS ABOVE).
R0298 4. STCALL STORE AND DO A CALL (BOTH ADDRESSES MUST BE DIRECT HERE).

R0300 STODL AND STOVL WILL TAKE FROM THE PUSH-DOWN LIST IF NO LOAD ADDRESS IS GIVEN.

03015 6423 BLOCK 3

```
0302  REF   5 LAST 954      6423  3 0155 0  STADR    CA      BANKSET     THE STADR CODE (PUSHUP UP ON STORE
0303  REF  16 LAST 961      6424  54 004 1            TS      FBANK       ADDRESS) ENTERS HERE.
0304  REF  19 LAST 960      6425  24 154 1            INCR    LOC
0305  REF  20 LAST 965      6426  50 154 1  ITR1     INDEX   LOC         THE STORECODE WAS STORED COMPLEMENTED TO
0306                        6427  4 0000 0           CS      0           MAKE IT LOOK LIKE AN OPCODE PAIR.
0307  REF   7 LAST 523      6430  6 7771 1           AD      NEGONE      (YUL CANT REMOVE 1 BECAUSE OF EARLY CCS)

0308  REF  13 LAST 959      6431  54 106 1  DOSTORE  TS      ADDRWD
0309  REF  10 LAST 405      6432  7 4563 1           MASK    LOW11       ENTRY FROM DISPATCHER. SAVE THE ERASABLE
0310  REF  14 LAST 965      6433  56 106 0           XCH     ADDRWD      ADDRESS AND JUMP ON THE STORE CODE NO.
0311  REF   1               6434  7 5655 0           MASK    B12114
0312                        6435  0 0006 1           EXTEND
0313  REF  32 LAST 823      6436  7 7757 1           MP      BIT5        EACH TRANSFER VECTOR ENTRY IS TWO WORDS.
0314  REF 323 LAST 961      6437  50 000 1  ITR0     INDEX   A
0315  REF   1               6440  1 6441 1           TCF     STORJUMP
```

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```
P0316           STORE CODE JUMP TABLE. CALLS THE APPROPRIATE STORING ROUTINE AND EXITS TO DANZIG OR TO ADDRESS WITH
R0318   A SUPPLIED OPERATION CODE.

 0319   REF   1                6441  0 6471 0  STORJUMP TC     STORE           STORE.
 0320   REF   2 LAST 953       6442  1 6133 1            TCF    NEWOPS -1       PICK UP NEW OP CODE(S).
 0321   REF   1                6443  0 6463 0            TC     STORE,1
 0322   REF   3 LAST 966       6444  1 6133 1            TCF    NEWOPS -1
 0323   REF   1                6445  0 6466 0            TC     STORE,2
 0324   REF   4 LAST 966       6446  1 6133 1            TCF    NEWOPS -1

 0325   REF   2 LAST 966       6447  0 6471 0            TC     STORE           STODL.
 0326   REF   1                6450  1 6527 0            TCF    DODLOAD

 0331   REF   3 LAST 966       6451  0 6471 0            TC     STORE           STODL WITH INDEXED LOAD ADDRESS.
 0332   REF   1                6452  1 6210 0            TCF    DODLOAD*

 0337   REF   4 LAST 966       6453  0 6471 0            TC     STORE           STOVL.
 0338   REF   1                6454  1 6532 1            TCF    DOVLOAD

 0343   REF   5 LAST 966       6455  0 6471 0            TC     STORE           STOVL WITH INDEXED LOAD ADDRESS.
 0344   REF   1                6456  1 6535 0            TCF    DOVLOAD*
 0349   REF   6 LAST 966       6457  0 6471 0            TC     STORE           STOIC.
 0350   REF   1                6460  3 5344 1            CAF    CALLCODE
 0351   REF  32 LAST 961       6461  54 020 1            TS     CYR
 0352   REF   1                6462  1 6316 1            TCF    15BITADR        GET A 15 BIT ADDRESS.
```

L INTERPRETER USER'S OWN PAGE NO. 15 S3

P0353 STORE CODE ADDRESS PROCESSOR.

```
0354  REF  36 LAST 957    6463  50 110 1  STORE,1   INDEX  FIXLOC
0355  REF  21 LAST 957    6464  4 0046 1            CS     X1
0356  REF   1             6465  1 6470 0            TCF    PRESTORE

0357  REF  37 LAST 967    6466  50 110 1  STORE,2   INDEX  FIXLOC
0358  REF   6 LAST 940    6467  4 0047 0            CS     X2
0359  REF  15 LAST 965    6470  26 106 1  PRESTORE  ADS    ADDRWD      RESULTANT ADDRESS IS IN ERASABLE.

0360  REF  16 LAST 967    6471  4 0106 1  STORE     CS     ADDRWD
03605 REF   1             6472  6 5353 1            AD     DEC45
0361  REF 324 LAST 965    6473  10 000 0            CCS    A           DOES THE ADDRESS POINT TO THE WORK AREA?
03615 REF  38 LAST 967    6474  3 0110 1            CA     FIXLOC      YES.
0362  REF   1             6475  1 6502 1            TCF    AHEAD5
03625 RLF   7 LAST 957    6476  3 5352 0            CA     OCT1400     NO.  SET EBANK & MAKE UP SUBADDRESS.
0363  REF  17 LAST 967    6477  56 106 0            XCH    ADDRWD
0364  REF  69 LAST 957    6500  54 003 0            TS     EBANK
0365  REF  14 LAST 957    6501  7 4564 0            MASK   LOW8
0366  REF  18 LAST 967    6502  26 106 1  AHEAD5    ADS    ADDRWD
```

```
P0367           STORING ROUTINES. STORE DP, TP, OR VECTOR AS INDICATED BY MODE.

 0368                        6503  0 0006 1  STARTSTO EXTEND          MPAC,+1 MUST BE STORED IN ANY EVENT.
R03685          ITRACE (5) REFERS TO "STARTSTO".
 0369   REF 389 LAST 940     6504  3 0145 1           DCA     MPAC
 0370   REF  19 LAST 967     6505  50 106 0           INDEX   ADDRWD
 0371                        6506  52 001 1           DXCH    0

 0372   REF  16 LAST 961     6507  10 153 1           CCS     MODE
 0373   REF   1              6510  1 6523 1           ICF     TSTORE
 0374   REF 266 LAST 952     6511  0 0002 0           TC      Q

 0375                        6512  0 0006 1  VSTORE   EXTEND
 0376   REF 390 LAST 968     6513  3 0150 0           DCA     MPAC +3
 0377   REF  20 LAST 968     6514  50 106 0           INDEX   ADDRWD
 0378                        6515  52 003 0           DXCH    2

 0379                        6516  0 0006 1           EXTEND
 0380   REF 391 LAST 968     6517  3 0152 1           DCA     MPAC +5
 0381   REF  21 LAST 968     6520  50 106 0           INDEX   ADDRWD
 0382                        6521  52 005 0           DXCH    4
 0383   REF 267 LAST 968     6522  0 0002 0           TC      Q

 0384   REF 392 LAST 968     6523  3 0146 1  TSTORE   CA      MPAC +2
 0385   REF  22 LAST 968     6524  50 106 0           INDEX   ADDRWD
 0386                        6525  54 002 1           TS      2
 0387   REF 268 LAST 968     6526  0 0002 0           TC      Q
```

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P0388 ROUTINES TO BEGIN PROCESSING OF THE SECOND ADDRESS ASSOCIATED WITH ALL STORE_TYPE CODES EXCEPT STORE
R0390 ITSELF.

```
 0391  REF   1                  6527  3 5345 0  DODLOAD   CAF   DLOADCOD
 0392  REF  33 LAST 966         6530  54 020 1             TS    CYR
 0393  REF   1                  6531  1 6152 0             ICF   DIRADRES       GO GET A DIRECT ADDRESS.

 0394  REF   1                  6532  3 7745 0  DOVLOAD   CAF   VLOADCOD
 0395  REF  34 LAST 969         6533  54 020 1             TS    CYR
 0396  REF   2 LAST 969         6534  1 6152 0             ICF   DIRADRES

 0397  REF   1                  6535  3 6153 0  DOVLOAD*  CAF   VLOAD*
 0398  REF   2 LAST 966         6536  1 6211 1             ICF   DODLOAD* +1     PROLOGUE TO INDEX ROUTINE.
```

P0399 THE FOLLOWING LOAD INSTRUCTIONS ARE PROVIDED FOR LOADING THE MULTI-PURPOSE ACCUMULATOR MPAC.

```
0401                        6537  0 0006 I  DLOAD    EXTEND
0402  REF  23 LAST 968      6540  5 0106 0          INDEX   ADDRWD
0403                        6541  3 0001 0          DCA     0           PICK UP DP ARGUMENT AND LEAVE IT IN
0404  REF 393 LAST 968      6542  52 145 0  SLOAD2   DXCH    MPAC        MPAC,+1, SETTING MPAC +2 TO ZERO. THE
0405  REF 263 LAST 939      6543  3 7767 0          CAF     ZERO        CONTENTS OF THE OTHER FOUR REGISTERS OF
0406  REF 394 LAST 970      6544  54 146 0          TS      MPAC +2     MPAC ARE IRRELEVANT.
0407  REF   4 LAST 361      6545  1 6124 1          TCF     NEWMODE     DECLARE DOUBLE PRECISION MODE.

0408  REF  24 LAST 970      6546  50 106 0  TLOAD    INDEX   ADDRWD
0409                        6547  3 0002 0          CA      2           LOAD A TRIPLE PRECISION ARGUMENT INTO
0410  REF 395 LAST 970      6550  54 146 0          TS      MPAC +2     THE FIRST THREE MPAC REGISTERS, WITH THE
0411                        6551  0 0006 I          EXTEND              CONTENTS OF THE OTHER FOUR IRRELEVANT.
0412  REF  25 LAST 970      6552  5 0106 0          INDEX   ADDRWD
0413                        6553  3 0001 0          DCA     0
0414  REF 396 LAST 970      6554  52 145 0          DXCH    MPAC
0415  REF 162 LAST 939      6555  3 7763 1          CAF     ONE
0416  REF   5 LAST 970      6556  1 6124 1          TCF     NEWMODE     DECLARE TRIPLE PRECISION MODE.

0417                        6557  22 007 0  SLOAD    ZL                  LOAD A SINGLE PRECISION NUMBER INTO
0418  REF  26 LAST 970      6560  50 106 0          INDEX   ADDRWD      MPAC, SETTING MPAC+1,2 TO ZERO. THE
0419                        6561  3 0000 1          CA      0           CONTENTS OF THE REMAINING MPAC REGISTERS
0420  REF   6 LAST 654      6562  1 6542 0          TCF     SLOAD2      ARE IRRELEVANT.

0421                        6563  0 0006 1  VLOAD    EXTEND              LOAD A DOUBLE PRECISION VECTOR INTO
0422  REF  27 LAST 970      6564  5 0106 0          INDEX   ADDRWD      MPAC,+1, MPAC+3,4, AND MPAC+5,6. THE
0423                        6565  3 0001 0          DCA     0           CONTENTS OF MPAC +2 ARE IRRELEVANT.
0424  REF 397 LAST 970      6566  52 145 0          DXCH    MPAC

0425                        6567  0 0006 1  ENDVLOAD EXTEND              PDVL COMES HERE TO FINISH UP FOR DP, TP.
0426  REF  28 LAST 970      6570  5 0106 0          INDEX   ADDRWD
0427                        6571  3 0003 1          DCA     2
0428  REF 398 LAST 970      6572  52 150 1          DXCH    MPAC +3

0429                        6573  0 0006 1  +4       EXTEND              TPDVL FINISHES HERE.
0430  REF  29 LAST 970      6574  5 0106 0          INDEX   ADDRWD
0431                        6575  3 0005 1          DCA     4
0432  REF 399 LAST 970      6576  52 152 0          DXCH    MPAC +5

0433  REF 163 LAST 970      6577  4 7763 0          CS      ONE         DECLARE VECTOR MODE.
0434  REF   6 LAST 970      6600  1 6124 1          TCF     NEWMODE
```

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P0435 THE FOLLOWING INSTRUCTIONS ARE PROVIDED FOR STORING OPERANDS IN THE PUSHDOWN LIST:

R0437 1. PUSH PUSHDOWN AND NO LOAD.
R0438 2. PDDL PUSHDOWN AND DOUBLE PRECISION LOAD.
R0439 3. PDVL PUSHDOWN AND VECTOR LOAD.

```
0440                          6601  0 0006 1  PDDL     EXTEND
0441  REF  30 LAST 970       6602  5 0106 0           INDEX   ADDRWD      LOAD MPAC,+1, PUSHING THE FORMER
0442                          6603  3 0001 0           DCA     0           CONTENTS DOWN.
0443  REF 400 LAST 970        6604  52 145 0           DXCH    MPAC
0444  REF   3 LAST 959        6605  50 156 0           INDEX   PUSHLOC
0445                          6606  52 001 1           DXCH    0

0446  REF  17 LAST 968        6607  50 153 0           INDEX   MODE        ADVANCE THE PUSHDOWN POINTER APPRO-
0447  REF   3 LAST 959        6610  3 6310 0           CAF     NO.WDS      PRIATELY.
0448  REF   4 LAST 971        6611  26 156 1           ADS     PUSHLOC

0449  REF  18 LAST 971        6612  10 153 1           CCS     MODE
0450  REF   1                 6613  1 6630 0           TCF     ENDTPUSH
0451  REF   1                 6614  1 6626 1           TCF     ENDDPUSH

0452  REF  19 LAST 971        6615  54 153 1           IS      MODE        NOW DP.
0453  REF 401 LAST 971        6616  54 146 0  ENDVPUSH IS      MPAC +2
0454  REF 402 LAST 971        6617  52 150 1           DXCH    MPAC +3     PUSH DOWN THE REST OF THE VECTOR HERE.
0455  REF   5 LAST 971        6620  50 156 0           INDEX   PUSHLOC
0456                          6621  51'775 0           DXCH    0 -4

0457  REF 403 LAST 971        6622  52 152 0           DXCH    MPAC +5
0458  REF   6 LAST 971        6623  50 156 0           INDEX   PUSHLOC
0459                          6624  51'777 1           DXCH    0 -2

0460  REF   6 LAST 782        6625  1 6125 0           TCF     DANZIG

0461  REF 404 LAST 971        6626  54 146 0  ENDDPUSH IS      MPAC +2     SET MPAC +2 TO ZERO AND EXIT ON DP.
0462  REF   7 LAST 971        6627  1 6125 0           TCF     DANZIG

0463  REF  20 LAST 971        6630  54 153 1  ENDTPUSH IS      MODE
0464  REF 405 LAST 971        6631  56 146 1           XCH     MPAC +2     ON TRIPLE, SET MPAC +2 TO ZERO, PUSHING
0465  REF   7 LAST 971        6632  50 156 0    +2     INDEX   PUSHLOC     DOWN THE OLD CONTENTS
0466                          6633  53'777 0           IS      0 -1
0467  REF   8 LAST 971        6634  1 6125 0           TCF     DANZIG
```

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P0468 PDVL - PUSHDOWN AND VECTOR LOAD.

```
0469                          6635  0 0006 1  PDVL    EXTEND                RELOAD MPAC AND PUSH DOWN ITS CONTENTS.
0470  REF  31 LAST 971        6636  5 0106 0          INDEX   ADDRWD
0471                          6637  3 0001 0          DCA     0
0472  REF 406 LAST 971        6640  52 145 0          DXCH    MPAC
0473  REF   8 LAST 971        6641  50 156 0          INDEX   PUSHLOC
0474                          6642  52 001 1          DXCH    0

0475  REF  21 LAST 971        6643  50 153 0          INDEX   MODE              ADVANCE THE PUSHDOWN POINTER.
0476  REF   4 LAST 971        6644  3 6310 0          CAF     NO.WDS
0477  REF   9 LAST 972        6645  26 156 1          ADS     PUSHLOC

0478  REF  22 LAST 972        6646  10 153 1          CCS     MODE              TEST PAST MODE.
0479  REF   1                 6647  1 6666 0          TCF     TPDVL
0480  REF   1                 6650  1 6567 1          TCF     ENDVLOAD          JUST LOAD LAST FOUR REGISTERS ON DP.

0481                          6651  0 0006 1  VPDVL   EXTEND                    PUSHDOWN AND RE-LOAD LAST TWO COMPONENTS
0482  REF  32 LAST 972        6652  5 0106 0          INDEX   ADDRWD
0483                          6653  3 0003 1          DCA     2
0484  REF 407 LAST 972        6654  52 150 1          DXCH    MPAC +3
0485  REF  10 LAST 972        6655  50 156 0          INDEX   PUSHLOC
0486                          6656  51'775 0          DXCH    0 -4

0487                          6657  0 0006 1          EXTEND
0488  REF  33 LAST 972        6660  5 0106 0          INDEX   ADDRWD
0489                          6661  3 0005 1          DCA     4
0490  REF 408 LAST 972        6662  52 152 0          DXCH    MPAC +5
0491  REF  11 LAST 972        6663  50 156 0          INDEX   PUSHLOC
0492                          6664  51'777 1          DXCH    0 -2

0493  REF   9 LAST 971        6665  1 6125 0          TCF     DANZIG

0494                          6666  0 0006 1  TPDVL   EXTEND                    ON TP, WE MUST LOAD THE Y COMPONENT
0495  REF  34 LAST 972        6667  5 0106 0          INDEX   ADDRWD            BEFORE STORING MPAC +2 INCASE THIS IS A
0496                          6670  3 0003 1          DCA     2                 PUSHUP.
0497  REF 409 LAST 972        6671  52 150 1          DXCH    MPAC +3

0498  REF 410 LAST 972        6672  3 0146 1          CA      MPAC +2
0499  REF  12 LAST 972        6673  50 156 0          INDEX   PUSHLOC           IN DP.
0500                          6674  53'777 0          TS      0 -1
0501  REF   2 LAST 972        6675  1 6573 1          TCF     ENDVLOAD +4

R0502          SSP (STORE SINGLE PRECISION) IS EXECUTED HERE.

0503  REF  21 LAST 965        6676  24 154 1  SSP     INCR    LOC               PICK UP THE WORD FOLLOWING THE GIVEN
0504  REF  22 LAST 972        6677  50 154 1          INDEX   LOC               ADDRESS AND STORE IT AT X.
0505                          6700  3 0000 1          CA      0
0506  REF  35 LAST 972        6701  50 106 0  STORE1  INDEX   ADDRWD            SOME INDEX AND MISCELLANEOUS OPS END
0507                          6702  54 000 0          TS      0                 HERE.
```

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0508 REF 10 LAST 972 6703 1 6125 0 ICF DANZIG

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P0509 SEQUENCE CHANGING AND SUBROUTINE CALLING OPTIONS.

R0510 THE FOLLOWING OPERATIONS ARE AVAILABLE FOR SEQUENCING CHANGING, BRANCHING, AND CALLING SUBROUTINES;

R0512 1. GOTO GO TO.
R0513 2. CALL CALL SUBROUTINE SETTING QPRET.
R0514 3. CGOTO COMPUTED GO TO.
R0515 4. CCALL COMPUTED CALL.
R0516 7. BPL BRANCH IF MPAC POSITIVE OR ZERO.
R0517 8. BZE BRANCH IF MPAC ZERO.
R0518 9. BMN BRANCH IF MPAC NEGATIVE NON-ZERO.

```
 0519   REF  23 LAST 972        6704  24 154 1  CCALL   INCR    LOC          MAINTAIN LOC FOR QPRET COMPUTATION.
 0520   REF  24 LAST 974        6705  50 154 1           INDEX   LOC
 0521                          6706  3 0000 1           CAF     0            GET BASE ADDRESS OF CADR LIST.
 0522   REF  36 LAST 972        6707  50 106 0           INDEX   ADDRWD
 0523                          6710  6 0000 1           AD      0            ADD INCREMENT.
 0524   REF  17 LAST 965        6711  54 004 1           TS      FBANK        SELECT DESIRED CADR.
 0525   REF  14 LAST 957        6712  7 5337 1           MASK    LOW10
 0526   REF 325 LAST 967        6713  50 000 1           INDEX   A
 0527                          6714  3 2000 0           CAF     10000
 0528   REF   7 LAST 960        6715  54 107 0           TS      POLISH

 0529   REF   6 LAST 965        6716  3 0155 0  CALL     CA      BANKSET      FOR ANY OF THE CALL OPTIONS, MAKE UP THE
 05295  REF   2 LAST 961        6717  7 6341 0           MASK    BANKMASK     ADDRESS OF THE NEXT OP-CODE PAIR/STORE
 0530   REF   3 LAST 974        6720  6 6341 1           AD      BANKMASK     CODE AND LEAVE IT IN QPRET.  NOTE THAT
 0531   REF  25 LAST 974        6721  6 0154 1           AD      LOC          BANKMASK = -(2000 - 1).
 0532   REF  39 LAST 967        6722  50 110 1           INDEX   FIXLOC
 0533   REF   3 LAST 847        6723  54 052 1           TS      QPRET

 0534   REF   8 LAST 974        6724  3 0107 1  GOTO     CA      POLISH       BASIC BRANCHING SEQUENCE.
 05345  REF   3 LAST 957        6725  7 5351 1  +1       MASK    HIGH4
 0535                          6726  0 0006 1           EXTEND
 05355  REF   1                 6727  1 6740 0           BZF     GOTOERS      SEE IF ADDRESS POINTS TO FIXED OR ERAS.
 0536   REF   7 LAST 974        6730  3 0155 0  +4       CA      BANKSET      SET EBANK PART OF BBANK, NEXT, SET UP
 05365  REF  22 LAST 954        6731  54 006 0           TS      BBANK        FBANK. THE COMBINATION IS PICKED UP &
 0537   REF   9 LAST 974        6732  3 0107 1           CA      POLISH       PUT INTO BANKSET AT INTPRET +2.
 05375  REF  18 LAST 974        6733  54 004 1           TS      FBANK
 0538   REF  15 LAST 974        6734  7 5337 1           MASK    LOW10
 05385  REF   2 LAST 957        6735  6 7751 0           AD      2K
 0539   REF  26 LAST 974        6736  54 154 0           TS      LOC
 05395  REF 110 LAST 953        6737  1 6114 1           TCF     INTPRET +2
```

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05398 E3 EBANK= 1400 SO YUL DOESN'T CUSS THE "CA 1400" BELOW.

```
0540   REF  10 LAST 974   6740  3 0107 1  GOTOERS  CA     POLISH     THE GIVEN ADDRESS IS IN ERASABLE - SEE
05405  REF   2 LAST 956   6741  6 6315 0           AD     -ENDVAC    IF RELATIVE TO THE WORK AREA.
0541   REF 326 LAST 974   6742  10 000 0           CCS    A
05415  REF  11 LAST 975   6743  3 0107 1           CA     POLISH     GENERAL ERASABLE.
0542   REF   1            6744  1 6753 1           TCF    GOTOGE

05425  REF  40 LAST 974   6745  3 0110 1           CA     FIXLOC     WORK AREA.
0543   REF  12 LAST 975   6746  6 0107 1           AD     POLISH
05435  REF 327 LAST 975   6747  50 000 1           INDEX  A          USE THE GIVEN ADDRESS AS THE ADDRESS OF
0544                      6750  3 0000 1           CA     0          THE BRANCH ADDRESS.
05445  REF  13 LAST 975   6751  54 107 0           TS     POLISH
0545   REF   1            6752  1 6725 0           TCF    GOTO +1    ALLOWS ARBITRARY INDIRECTNESS LEVELS.

05455  REF  70 LAST 967   6753  54 003 0  GOTOGE   TS     EBANK
0546   REF  15 LAST 967   6754  7 4564 0           MASK   LOW8
0547   REF 328 LAST 975   6755  50 000 1           INDEX  A          USE THE GIVEN ADDRESS AS THE ADDRESS OF
0548                      6756  3 1400 1           CA     1400       THE BRANCH ADDRESS.
0549   REF  14 LAST 975   6757  54 107 0           TS     POLISH
0550   REF   2 LAST 975   6760  1 6725 0           TCF    GOTO +1

0551   REF  27 LAST 974   6761  50 154 1  CGOTO    INDEX  LOC        COMPUTED GO TO. PICK UP ADDRESS OF CADR
0552                      6762  3 0001 0           CA     1          LIST.
0553   REF  37 LAST 974   6763  50 106 0           INDEX  ADDRWD     ADD MODIFIER.
0554                      6764  6 0000 1           AD     0
0555   REF  19 LAST 974   6765  54 004 1           TS     FBANK      SELECT GOTO ADDRESS.
0556   REF  16 LAST 974   6766  7 5337 1           MASK   LOW10
0557   REF 329 LAST 975   6767  50 000 1           INDEX  A
0558                      6770  3 2000 0           CA     10000
05585  REF  15 LAST 975   6771  54 107 0           TS     POLISH
0559   REF   3 LAST 975   6772  1 6725 0           TCF    GOTO +1    WITH ADDRESS IN A.

0560   REF   8 LAST 974   6773  3 0155 0  SWBRANCH CA     BANKSET    SWITCH INSTRUCTIONS WHICH ELECT TO
0561   REF  20 LAST 975   6774  54 004 1           TS     FBANK      BRANCH COME HERE TO DO SO.
0562   REF  28 LAST 975   6775  50 154 1           INDEX  LOC
0563                      6776  3 0001 0           CA     1
05635  REF  16 LAST 975   6777  54 107 0           TS     POLISH
0564   REF   4 LAST 975   7000  1 6725 0           TCF    GOTO +1
```

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```
P0566           TRIPLE PRECISION BRANCHING ROUTINE. IF CALLING TC IS AT L, RETURN IS AS FOLLOWS:

R0568           L+1  IF MPAC IS GREATER THAN ZERO.
R0569           L+2  IF MPAC IS EQUAL TO +0 OR -0.
R0570           L+3  IF MPAC IS LESS THAN ZERO.


 0571   REF 411 LAST 972        7001  10 144 1  BRANCH   CCS     MPAC
 0572   REF 269 LAST 968        7002  0 0002 0           TC      Q
 0573                           7003  1 7005 1           TCF     +2          ON ZERO.
 0574   REF   1                 7004  1 7017 1           TCF     NEG

 0575   REF 412 LAST 976        7005  10 145 0           CCS     MPAC +1
 0576   REF 270 LAST 976        7006  0 0002 0           TC      Q
 0577                           7007  1 7011 1           TCF     +2
 0578   REF   2 LAST 976        7010  1 7017 1           TCF     NEG

 0579   REF 413 LAST 976        7011  10 146 0           CCS     MPAC +2
 0580   REF 271 LAST 976        7012  0 0002 0           TC      Q
 0581                           7013  1 7015 0           TCF     +2
 0582   REF   3 LAST 976        7014  1 7017 1           TCF     NEG

 0583   REF 272 LAST 976        7015  50 002 0  Q+1      INDEX   Q
 0584                           7016  0 0001 0           TC      1

 0585   REF 273 LAST 976        7017  50 002 0  NEG      INDEX   Q           IF FIRST NON-ZERO REGISTER WAS NEGATIVE.
 0586                           7020  0 0002 0           TC      2


 05861  REF   4 LAST 976              7017  Q+2      =       NEG

R05865          ITRACE (3) REFERS TO "EXIT".
 0587   REF   9 LAST 975        7021  3 0155 0  EXIT     CA      BANKSET     RESTORE USER'S BANK SETTING, AND LEAVE
 05874  REF  23 LAST 974        7022  54 006 0           IS      BBANK       INTERPRETIVE MODE.
 05876  REF  29 LAST 975        7023  50 154 1           INDEX   LOC
 0588                           7024  0 0001 0           TC      1
```

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P0589 SECTION 3 - ADD/SUBTRACT PACKAGE.

R0590 THE FOLLOWING OPERATIONS ARE PROVIDED FOR ADDING TO AND SUBTRACTING FROM THE MULTI-PURPOSE ACCUMULATOR
R0592 MPAC:

R0593 1. DAD DOUBLE PRECISION ADD.
R0594 2. DSU DOUBLE PRECISION SUBTRACT.
R0595 3. BDSU DOUBLE PRECISION SUBTRACT FROM.

R0596 4. TAD TRIPLE PRECISION ADD.

R0597 5. VAD VECTOR ADD.
R0598 6. VSU VECTOR SUBTRACT.
R0599 7. BVSU VECTOR SUBTRACT FROM.

R0600 THE INTERPRETIVE OVERFLOW INDICATOR OVFIND IS SET NON-ZERO IF OVERFLOW OCCURS IN ANY OF THE ABOVE.

```
0602                          7025  0 0006 1  VAD      EXTEND
0603  REF  38 LAST 975        7026  5 0106 0          INDEX   ADDRWD
0604                          7027  3 0003 1          DCA     2
0605  REF 414 LAST 976        7030 20 150  1          DAS     MPAC +3
0606                          7031  0 0006 1          EXTEND                  CHECK OVERFLOW.
0607                          7032  1 7034 0          BZF     +2
0608  REF   1                 7033  0 7101 0          TC      OVERFLOW

0609                          7034  0 0006 1          EXTEND
0610  REF  39 LAST 977        7035  5 0106 0          INDEX   ADDRWD
0611                          7036  3 0005 1          DCA     4
0612  REF 415 LAST 977        7037 20 152  0          DAS     MPAC +5
0613                          7040  0 0006 1          EXTEND
0614                          7041  1 7043 0          BZF     +2
0615  REF   2 LAST 977        7042  0 7101 0          TC      OVERFLOW

0616                          7043  0 0006 1  DAD      EXTEND
0617  REF  40 LAST 977        7044  5 0106 0          INDEX   ADDRWD
0618                          7045  3 0001 0          DCA     0
0619  REF 416 LAST 977        7046 20 145  0  ENDVXV   DAS     MPAC            VXV FINISHES HERE.
0620                          7047  0 0006 1          EXTEND
0621  REF  11 LAST 973        7050  1 6125 0          BZF     DANZIG
0622  REF   3 LAST 977        7051  0 7101 0          TC      OVERFLOW
0623  REF  12 LAST 977        7052  1 6125 0          TCF     DANZIG
```

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```
0624                          7053  0 0006 1  VSU       EXTEND
0625  REF  41 LAST 977       7054  5 0106 0            INDEX   ADDRWD
0626                          7055  4 0003 0            DCS     2
0627  REF 417 LAST 977       7056 20 150  1            DAS     MPAC +3
0628                          7057  0 0006 1            EXTEND
0629                          7060  1 7062 0            BZF     +2
0630  REF   4 LAST 977       7061  0 7101 0            TC      OVERFLOW

0631                          7062  0 0006 1            EXTEND
0632  REF  42 LAST 978       7063  5 0106 0            INDEX   ADDRWD
0633                          7064  4 0005 0            DCS     4
0634  REF 418 LAST 978       7065 20 152  0            DAS     MPAC +5
0635                          7066  0 0006 1            EXTEND
0636                          7067  1 7071 1            BZF     +2
0637  REF   5 LAST 978       7070  0 7101 0            TC      OVERFLOW

0638                          7071  0 0006 1  DSU       EXTEND
0639  REF  43 LAST 978       7072  5 0106 0            INDEX   ADDRWD
0640                          7073  4 0001 1            DCS     0
0641  REF 419 LAST 978       7074 20 145  0            DAS     MPAC
0642                          7075  0 0006 1            EXTEND
0643  REF  13 LAST 977       7076  1 6125 0            BZF     DANZIG
0644  REF   6 LAST 978       7077  0 7101 0            TC      OVERFLOW
0645  REF  14 LAST 978       7100  1 6125 0            TCF     DANZIG

0646  REF 164 LAST 970       7101  3 7763 1  OVERFLOW  CAF     ONE       SUBROUTINE TO TURN OVFIND ON.
0647  REF   1                 7102  1 7224 0            TCF     SETOVF2
```

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```
0648                          7103  0 0006 1  BVSU    EXTEND
0649  REF  44 LAST 978        7104  5 0106 0          INDEX   ADDRWD
0650                          7105  3 0003 1          DCA     2
0651  REF 420 LAST 978        7106  52 150 1          DXCH    MPAC +3
0652                          7107  0 0006 1          EXTEND
0653                          7110  4 0001 1          DCOM
0654  REF 421 LAST 979        7111  20 150 1          DAS     MPAC +3
0655                          7112  0 0006 1          EXTEND
0656                          7113  1 7115 1          BZF     +2
0657  REF   7 LAST 978        7114  0 7101 0          TC      OVERFLOW

0658                          7115  0 0006 1          EXTEND
0659  REF  45 LAST 979        7116  5 0106 0          INDEX   ADDRWD
0660                          7117  3 0005 1          DCA     4
0661  REF 422 LAST 979        7120  52 152 0          DXCH    MPAC +5
0662                          7121  0 0006 1          EXTEND
0663                          7122  4 0001 1          DCOM
0664  REF 423 LAST 979        7123  20 152 0          DAS     MPAC +5
0665                          7124  0 0006 1          EXTEND
0666                          7125  1 7127 0          BZF     +2
0667  REF   8 LAST 979        7126  0 7101 0          TC      OVERFLOW

0668                          7127  0 0006 1  BDSU    EXTEND
0669  REF  46 LAST 979        7130  5 0106 0          INDEX   ADDRWD
0670                          7131  3 0001 0          DCA     0
0671  REF 424 LAST 979        7132  52 145 0          DXCH    MPAC
0672                          7133  0 0006 1          EXTEND
0673                          7134  4 0001 1          DCOM
0674  REF 425 LAST 979        7135  20 145 0          DAS     MPAC
0675                          7136  0 0006 1          EXTEND
0676  REF  15 LAST 978        7137  1 6125 0          BZF     DANZIG
0677  REF   9 LAST 979        7140  0 7101 0          TC      OVERFLOW
0678  REF  16 LAST 979        7141  1 6125 0          TCF     DANZIG
```

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P0679 TRIPLE PRECISION ADD ROUTINE.

```
0680                                7142  0 0006 1  TAD       EXTEND
0681   REF  47 LAST 979             7143  5 0106 0            INDEX     ADDRWD
0682                                7144  3 0002 0            DCA       I          ADD MINOR PARTS FIRST.
0683   REF 426 LAST 979             7145  20 146 0            DAS       MPAC +1
0684   REF  48 LAST 980             7146  50 106 0            INDEX     ADDRWD
0685                                7147  6 0000 1            AD        0
0686   REF 427 LAST 980             7150  6 0144 0            AD        MPAC
0687   REF 428 LAST 980             7151  54 144 1            TS        MPAC
0688   REF  17 LAST 979             7152  1 6125 0            TCF       DANZIG

0689   REF  14 LAST 904             7153  54 111 1  SETOVF     TS        OVFIND     SET OVFIND IF SUCH OCCURS.
0690   REF  18 LAST 980             7154  1 6125 0            TCF       DANZIG
```

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P0691 ARITHMETIC SUBROUTINES REQUIRED IN FIXED-FIXED.

R0692 1. DMPSUB DOUBLE PRECISION MULTIPLY. MULTIPLY THE CONTENTS OF MPAC+1 BY THE DP WORD WHOSE ADDRESS
R0694 IS IN ADDRWD AND LEAVE A TRIPLE PRECISION RESULT IN MPAC.
R0696 2. ROUNDSUB ROUND THE TRIPLE PRECISON CONTENTS OF MPAC TO DOUBLE PRECISION.
R0698 3. DOTSUB TAKE THE DOT PRODUCT OF THE VECTOR IN MPAC AND THE VECTOR WHOSE ADDRESS IS IN ADDRWD
R0700 AND LEAVE THE TRIPLE PRECISION RESULT IN MPAC.
R0701 4. POLY USING THE CONTENTS OF MPAC AS A DP ARGUMENT, EVALUATE THE POLYNOMIAL WHOSE DEGREE AND
R0703 COEFFICIENTS IMMEDIATELY FOLLOW THE TC POLY INSTRUCTION (SEE ROUTINE FOR DETAILS.)

```
0705  REF 274 LAST 976     7155  50 002 0  DMP     INDEX  Q        BASIC SUBROUTINE FOR USE BY PINBALL, ETC
0706                       7156  3 0000 1           CAF    0        ADRES OF ARGUMENT FOLLOWS  TC DMP  .
0707  REF 275 LAST 981     7157  24 002 0           INCR   Q
0708  REF  49 LAST 980     7160  54 106 1   -1      TS     ADDRWD   (PROLOGUE FOR SETTING ADDRWD.)

0709  REF  50 LAST 981     7161  50 106 0  DMPSUB  INDEX  ADDRWD   GET MINOR PART OF OPERAND AT C(ADDRWD).
0710                       7162  3 0001 0           CA     1
0711  REF 429 LAST 980     7163  54 146 0           TS     MPAC +2  THIS WORKS FOR SQUARING MPAC AS WELL.
0712  REF 264 LAST 970     7164  3 7767 0           CAF    ZERO     SET MPAC +1 TO ZERO SO WE CAN ACCUMULATE
0713  REF 430 LAST 981     7165  56 145 1           XCH    MPAC +1  THE PARTIAL PRODUCTS WITH DAS
0714  REF   6 LAST 949     7166  54 125 0           TS     MPTEMP   INSTRUCTIONS.
0715                       7167  0 0006 1           EXTEND
0716  REF 431 LAST 981     7170  7 0146 0           MP     MPAC +2  MINOR OF MPAC X MINOR OF C(ADDRWD).

0717  REF 432 LAST 981     7171  56 146 1           XCH    MPAC +2  DISCARD MINOR PART OF ABOVE RESULT AND
0718                       7172  0 0006 1           EXTEND          FORM MAJOR OF MPAC X MINOR OF C(ADDRWD).
0719  REF 433 LAST 981     7173  7 0144 1           MP     MPAC
0720  REF 434 LAST 981     7174  20 146 0           DAS    MPAC +1  GUARANTEED NO OVERFLOW.

0721  REF  51 LAST 981     7175  50 106 0           INDEX  ADDRWD   GET MAJOR PART OF ARGUMENT AT C(ADDRWD).
0722                       7176  3 0000 1           CA     0
0723  REF   7 LAST 981     7177  56 125 1           XCH    MPTEMP   SAVE AND BRING OUT MINOR OF MPAC.
0724                       7200  0 0006 1           EXTEND
0725  REF   8 LAST 981     7201  7 0125 0           MP     MPTEMP   MAJOR OF C(ADDRWD) X MINOR OF MPAC.
0726  REF 435 LAST 981     7202  20 146 0           DAS    MPAC +1  ACCUMULATE, SETTING A TO NET OVERFLOW.

0727  REF 436 LAST 981     7203  56 144 0           XCH    MPAC     SETTING MPAC TO 0 OR +-1.
0728                       7204  0 0006 1           EXTEND
0729  REF   9 LAST 981     7205  7 0125 0           MP     MPTEMP   MAJOR OF MPAC X MAJOR OF C(ADDRWD).
0730  REF 437 LAST 981     7206  20 145 0           DAS    MPAC     GUARANTEED NO OVERFLOW.
0731  REF 276 LAST 981     7207  0 0002 0           TC     Q        49 MCT = .573 MS. INCLUDING RETURN.
```

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P0732 ROUND MPAC TO DOUBLE PRECISION, SETTING OVFIND ON THE RARE EVENT OF OVERFLOW.

```
0734  REF 265 LAST 981   7210  3 7767 0  ROUNDSUB  CAF    ZERO      SET MPAC +2 = 0 FOR SCALARS AND CHANGE
0735  REF  23 LAST 972   7211  54 153 1    +1       TS     MODE      MODE TO DP.

0736  REF 438 LAST 981   7212  56 146 1  VROUND    XCH    MPAC +2   BUT WE NEEDNT TAKE THE TIME FOR VECTORS.
0737                     7213  6 0000 1            DOUBLE
0738  REF 167 LAST 950   7214  54 001 1            TS     L
0739  REF 277 LAST 981   7215  0 0002 0            IC     Q

0740  REF 439 LAST 982   7216  6 0145 1            AD     MPAC +1   ADD ROUNDING BIT IF MPAC +2 WAS GREATER
0741  REF 440 LAST 982   7217  54 145 0            TS     MPAC +1   THAN .5 IN MAGNITUDE.
0742  REF 278 LAST 982   7220  0 0002 0            IC     Q

0743  REF 441 LAST 982   7221  6 0144 0            AD     MPAC      PROPAGATE INTERFLOW.
0744  REF 442 LAST 982   7222  54 144 1            TS     MPAC
0745  REF 279 LAST 982   7223  0 0002 0            IC     Q

0746  REF  15 LAST 980   7224  54 111 1  SETOVF2   TS     OVFIND    (RARE).
0747  REF 280 LAST 982   7225  0 0002 0            IC     Q
```

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P0748 THE DOT PRODUCT SUBROUTINE USUALLY FORMS THE DOT PRODUCT OF THE VECTOR IN MPAC WITH A STANDARD SIX
R0750 REGISTER VECTOR WHOSE ADDRESS IS IN ADDRWD. IN THIS CASE C(DOTINC) ARE SET TO 2. VXM, HOWEVER, SETS C(DOTINC) TO
R0752 6 SO THAT DOTSUB DOTS MPAC WITH A COLUMN VECTOR OF THE MATRIX IN QUESTION IN THIS CASE.

0754	REF 97	LAST 901	7226	3 7762 0	PREDOT	CAF	TWO	PROLOGUE TO SET DOTINC TO 2.
0755	REF 4	LAST 20	7227	54 126 0		TS	DOTINC	
0756			7230	0 0006 1	DOTSUB	EXTEND		
0757	REF 5	LAST 20	7231	22 127 0		DXCH	DOTRET	SAVE RETURN.
0758	REF 1		7232	0 7161 0		IC	DMPSUB	DOT X COMPONENTS.
0759	REF 443	LAST 982	7233	52 150 1		DXCH	MPAC +3	POSITION Y COMPONENT OF MPAC FOR
0760	REF 444	LAST 983	7234	52 145 0		DXCH	MPAC	MULTIPLICATION WHILE SAVING RESULT IN
0761	REF 68	LAST 925	7235	52 121 1		DXCH	BUF	THREE WORD BUFFER, BUF.
0762	REF 445	LAST 983	7236	3 0146 1		CA	MPAC +2	
0763	REF 69	LAST 983	7237	54 122 1		TS	BUF +2	
0764	REF 5	LAST 983	7240	3 0126 1		CA	DOTINC	ADVANCE ADDRWD TO Y COMPONENT OF
0765	REF 52	LAST 981	7241	26 106 1		ADS	ADDRWD	OTHER ARGUMENT.
0766	REF 2	LAST 983	7242	0 7161 0		IC	DMPSUB	
0767	REF 446	LAST 983	7243	52 146 0		DXCH	MPAC +1	ACCUMULATE PARTIAL PRODUCTS.
0768	REF 70	LAST 983	7244	20 122 1		DAS	BUF +1	
0769	REF 447	LAST 983	7245	6 0144 0		AD	MPAC	
0770	REF 71	LAST 983	7246	6 0120 1		AD	BUF	
0771	REF 72	LAST 983	7247	54 120 0		TS	BUF	
0772			7250	1 7252 1		ICH	+2	
0773	REF 16	LAST 982	7251	54 111 1		TS	OVFIND	IF OVERFLOW OCCURS.
0774	REF 448	LAST 983	7252	52 152 0		DXCH	MPAC +5	MULTIPLY Z COMPONENTS.
0775	REF 449	LAST 983	7253	52 145 0		DXCH	MPAC	
0776	REF 6	LAST 983	7254	3 0126 1		CA	DOTINC	
0777	REF 53	LAST 983	7255	26 106 1		ADS	ADDRWD	
0778	REF 3	LAST 983	7256	0 7161 0		IC	DMPSUB	
0779	REF 73	LAST 983	7257	52 122 1	ENDDOT	DXCH	BUF +1	LEAVE FINAL ACCUMULATION IN MPAC.
0780	REF 450	LAST 983	7260	20 146 0		DAS	MPAC +1	
0781	REF 451	LAST 983	7261	6 0144 0		AD	MPAC	
0782	REF 74	LAST 983	7262	6 0120 1		AD	BUF	
0783	REF 452	LAST 983	7263	54 144 1		TS	MPAC	
0784	REF 6	LAST 983	7264	0 0127 0		IC	DOTRET	
0785	REF 17	LAST 983	7265	54 111 1		TS	OVFIND	ON OVERFLOW HERE.
0786	REF 7	LAST 983	7266	0 0127 0		IC	DOTRET	

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P0787 DOUBLE PRECISION POLYNOMIAL EVALUATOR

R0788
R0789 THIS ROUTINE EVALUATES $A_N X^N + A_{N-1} X^{N-1} + \cdots + A_1 X + A_0$ LEAVING THE DP RESULT IN MPAC ON EXIT.
R0791

R0792 THE ROUTINE HAS TWO ENTRIES

R0793 1. ENTRY THRU POWRSERS. THE COEFFICIENTS MAY BE EITHER IN FIXED OR ERASABLE. THE CALL IS BY
R0795 TC POWRSERS, AND THE RETURN IS TO LOC(TC POWRSERS)+1. THE ENTERING DATA MUST BE AS FOLLOWS

```
A0797                                   A       SP      LOC-3           ADDRESS FOR REFERENCING COEF TABLE
A0798                                   L       SP      N-1             N IS THE DEGREE OF THE POWER SERIES
A0799                                   MPAC    DP      X               ARGUMENT

A0800                                   LOC-2N  DP      A(0)
A0801                                           ...
A0802                                   LOC     DP      A(N)
```

R0803 2. ENTRY THRU POLY. THE CALL TO POLY AND THE ENTERING DATA MUST BE AS FOLLOWS

```
A0805                                   MPAC    DP      X               ARGUMENT

A0806                                   LOC     TC      POLY
A0807                                   LOC+1   SP      N-1
A0808                                   LOC+2   DP      A(0)
A0809                                           ...
A0810                                   LOC+2N+2 DP     A(N)            RETURN IS TO LOC+2N+4

 0811                   7267  0 0006 1  POWRSERS EXTEND
 0812  REF   1         7270  22 131 1           QXCH    POLYRET         RETURN ADDRESS
 0813  REF  17 LAST 975 7271  54 107 0          TS      POLISH          POWER SERIES ADDRESS
 0814  REF   1         7272  22 130 0           LXCH    POLYCNT         N-1 TO COUNTER
 0815  REF   1         7273  1 7304 0           ICF     POLYCOM         SKIP SET UP BY POLY

 0816  REF 281 LAST 982 7274  50 002 0  POLY     INDEX   Q
 0817                   7275  3 0000 1           CAF     0
 0818  REF   2 LAST 984 7276  54 130 1           TS      POLYCNT         N-1 TO COUNTER
 0819                   7277  6 0000 1           DOUBLE
 0820  REF 282 LAST 984 7300  6 0002 0           AD      Q
 0821  REF  18 LAST 984 7301  54 107 0          TS      POLISH          L(A(N))-3 TO POLISH
 0822  REF  17 LAST 886 7302  6 7766 1           AD      FIVE
 0823  REF   2 LAST 984 7303  54 131 0          TS      POLYRET         STORE RETURN ADDRESS

 0824  REF   1         7304  3 5347 1  POLYCOM  CAF     LVBUF           INCOMING X WILL BE MOVED TO VBUF, SO
 0825  REF  54 LAST 983 7305  54 106 1           TS      ADDRWD          SET ADDRWD SO DMPSUB WILL MPY BY VBUF.

 0826                   7306  0 0006 1           EXTEND
 0827  REF  19 LAST 984 7307  5 0107 1           INDEX   POLISH
 0828                   7310  3 0004 0           DCA     3
```

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```
0829  REF 453 LAST 983    7311  52 145 0          DXCH  MPAC      LOAD A(N) INTO MPAC,
0830  REF  24 LAST 866    7312  52 113 0          DXCH  VBUF      SAVING X IN VBUF
0831  REF   1             7313  1 7317 1          ICF   POLY2

0832  REF   3 LAST 984    7314  54 130 1  POLYLOOP TS    POLYCNT   SAVE DECREMENTED LOOP COUNTER
0833  REF  98 LAST 983    7315  4 7762 1          CS    TWO
0834  REF  20 LAST 984    7316  26 107 0          ADS   POLISH    REGRESS COEFFICIENT POINTER

0835  REF   4 LAST 983    7317  0 7161 0  POLY2   IC    DMPSUB    MULTIPLY BY X
0836                      7320  0 0006 1          EXTEND
0837  REF  21 LAST 985    7321  5 0107 I          INDEX POLISH
0838                      7322  3 0002 0          DCA   1         ADD IN NEXT COEFFICIENT
0839  REF 454 LAST 985    7323  20 145 0          DAS   MPAC      USERS RESPONSIBILITY TO ASSURE NO OVFLOW

0840  REF   4 LAST 985    7324  10 130 1          LCS   POLYCNT
0841  REF   1             7325  1 7314 I          ICF   POLYLOOP
0842  REF   3 LAST 984    7326  0 0131 I          IC    POLYRET   RETURN CALLER
```

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P0843 MISCELLANEOUS MULTI-PRECISION ROUTINES REQUIRED IN FIXED-FIXED BUT NOT USED BY THE INTERPRETER.

```
0845  REF 283 LAST 984   7327  22 002 0  TPAGREE  LXCH  Q          FORCE SIGN AGREEMENT AMONG THE TRIPLE
0847  REF   1            7330  0 7001 1           TC    BRANCH     PRECISION CONTENTS OF MPAC.  RETURNING
0848  REF   1            7331  1 7335 1           TCF   ARG+       WITH SIGNUM OF THE INPUT IN A.
0849  REF   1            7332  1 7355 1           TCF   ARGZERO

0850  REF  51 LAST 896   7333  4 7743 1           CS    POSMAX     IF NEGATIVE.
0851                     7334  1 7336 1           TCF   +2

0852  REF  52 LAST 986   7335  3 7743 0  ARG+     CAF   POSMAX
0853  REF 284 LAST 986   7336  54 002 1           IS    Q
0854                     7337  0 0006 1           EXTEND
0855  REF 330 LAST 975   7340  24 000 1           AUG   A          FORMS +-1.0.
0856  REF 455 LAST 985   7341  6 0146 1           AD    MPAC +2
0857  REF 456 LAST 986   7342  54 146 0           IS    MPAC +2
0858  REF 266 LAST 982   7343  3 7767 0           CAF   ZERO
0859  REF 285 LAST 986   7344  6 0002 0           AD    Q
0860  REF 457 LAST 986   7345  6 0145 1           AD    MPAC +1
0861  REF 458 LAST 986   7346  54 145 0           IS    MPAC +1
0862  REF 267 LAST 986   7347  3 7767 0           CAF   ZERO
0863  REF 286 LAST 986   7350  6 0002 0           AD    Q          Q STILL HAS POSMAX OR NEGMAX IN IT.
0864  REF 459 LAST 986   7351  6 0144 0           AD    MPAC
0865  REF 460 LAST 986   7352  54 144 1  ARGZERO2  IS    MPAC       ALWAYS SKIPPING UNLESS ARGZERO.
0866  REF 461 LAST 986   7353  54 145 0           IS    MPAC +1
0867  REF 168 LAST 982   7354  0 0001 0           TC    L          RETURN VIA L.

0868  REF 462 LAST 986   7355  54 146 0  ARGZERO  IS    MPAC +2    SET ALL THREE MPAC REGISTERS TO ZERO.
0869  REF   1            7356  1 7352 0           TCF   ARGZERO2
```

R0870 SHORTMP MULTIPLIES THE TP CONTENTS OF MPAC BY THE SINGLE PRECISION NUMBER ARRIVING IN A.

```
0872  REF  10 LAST 981   7357  54 125 0  SHORTMP  IS    MPTEMP
0873                     7360  0 0006 1           EXTEND
0874  REF 463 LAST 986   7361  7 0146 0           MP    MPAC +2
0875  REF 464 LAST 986   7362  54 146 0           IS    MPAC +2
0876  REF 268 LAST 986   7363  3 7767 0           CAF   ZERO       SO SUBSEQUENT DAS WILL WORK.
0877  REF 465 LAST 986   7364  56 145 1           XCH   MPAC +1
0878                     7365  0 0006 1           EXTEND
0879  REF  11 LAST 986   7366  7 0125 0           MP    MPTEMP
0880  REF 466 LAST 986   7367  20 146 0           DAS   MPAC +1
0881  REF 467 LAST 986   7370  56 144 0           XCH   MPAC       SETTING MPAC TO 0.
0882                     7371  0 0006 1           EXTEND
0883  REF  12 LAST 986   7372  7 0125 0           MP    MPTEMP
0884  REF 468 LAST 986   7373  20 145 0           DAS   MPAC
0885  REF 287 LAST 986   7374  0 0002 0           TC    Q
```

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```
P0886          DMPNSUB MULTIPLIES THE DP FRACTION ARRIVING IN MPAC BY THE SP
R0887   INTEGER ARRIVING IN A.  THE DP PRODUCT DEPARTS BOTH IN MPAC AND IN
R0888   A AND L.  NOTE THAT DMPNSUB NORMALLY INCREASES THE MAGNITUDE OF THE
R0889   CONTENTS OF MPAC.  THE CUSTOMER MUST INSURE THAT B(A) X B(MPAC,MPAC+1)
R0890   AND B(A) X B(MPAC) ARE LESS THAN 1 IN MAGNITUDE, WHERE B, AS IS OBVIOUS,
R08905  INDICATES THE ARRIVING CONTENTS.

 0891   REF   1                 7375  54 125 0  DMPNSUB  TS      DMPNTEMP
 0892                           7376  0 0006 1            EXTEND
 0893   REF 469 LAST 986        7377  7 0145 0            MP      MPAC +1
 0894   REF 470 LAST 987        7400  52 145 0            DXCH    MPAC          LOW PRODUCT TO MPAC, HIGH FACTOR TO A
 0895                           7401  0 0006 1            EXTEND
 0896   REF   2 LAST 987        7402  7 0125 0            MP      DMPNTEMP
 0897   REF 169 LAST 986        7403  3 0001 0            CA      L
 0898   REF 471 LAST 987        7404  26 144 1            ADS     MPAC          COMPLETING THE PRODUCT IN MPAC
 0899                           7405  0 0006 1            EXTEND
 0900   REF 472 LAST 987        7406  3 0145 1            DCA     MPAC          BRINGING THE PRODUCT INTO A AND L
 0901   REF 288 LAST 986        7407  0 0002 0            IC      Q
```

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P0902 MISCELLANEOUS VECTOR OPERATIONS. INCLUDED HERE ARE THE FOLLOWING:

R0903 1. DOT DP VECTOR DOT PRODUCT.
R0904 2. VXV DP VECTOR CROSS PRODUCT.
R0905 3. VXSC DP VECTOR TIMES SCALAR.
R0906 4. V/SC DP VECTOR DIVIDED BY SCALAR.
R0907 5. VPROJ DP VECTOR PROJECTION. ((MPAC.X)MPAC).
R0908 6. VXM DP VECTOR POST-MULTIPLIED BY MATRIX.
R0909 7. MXV DP VECTOR PRE-MULTIPLIED BY MATRIX.

```
0910  REF   1                  7410  0 7226 0  DOT     TC     PREDOT      DO THE DOT PRODUCT AND EXIT, CHANGING
0911  REF 269 LAST 986         7411  3 7767 0          CAF    ZERO        THE MODE TO DP SCALAR.
0912  REF   7 LAST 970         7412  1 6124 1          TCF    NEWMODE

0913  REF  99 LAST 985         7413  3 7762 0  MXV     CAF    TWO         SET UP MATINC AND DOTINC FOR ROW
0914  REF   6 LAST  20         7414  54 130 1          TS     MATINC      VECTORS.
0915  REF   1                  7415  1 7421 0          TCF    VXM/MXV     GO TO COMMON PORTION.

0916  REF   8 LAST 937         7416  4 4570 0  VXM     CS     TEN         SET MATINC AND DOTINC TO REFER TO MATRIX
0917  REF   7 LAST 988         7417  54 130 1          TS     MATINC      AS THREE COLUMN VECTORS.
0918  REF  19 LAST 810         7420  3 6306 1          CAF    SIX
```

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P0919 COMMON PORTION OF MXV AND VXM.

```
0920   REF   7 LAST 983      7421  54 126 0  VXM/MXV  IS     DOTINC
R09205          ;TRACE (2) REFERS TO "VXM/MXV".
0921   REF   1               7422  0 7612 0           TC     MPACVBUF     SAVE VECTOR IN MPAC FOR FURTHER USE.

0922   REF   1               7423  0 7230 1           TC     DOTSUB       GO DOT TO GET X COMPONENT OF ANSWER.
0923                        7424  0 0006 1           EXTEND
0924   REF  25 LAST 985      7425  3 0113 1           DCA    VBUF         MOVE MPAC VECTOR BACK INTO MPAC, SAVING
0925   REF 473 LAST 987      7426  52 145 0           DXCH   MPAC         NEW X COMPONENT IN BUF2.
0926   REF  13 LAST 949      7427  52 124 1           DXCH   BUF2
0927                        7430  0 0006 1           EXTEND
0928   REF  26 LAST 989      7431  3 0115 1           DCA    VBUF +2
0929   REF 474 LAST 989      7432  52 150 1           DXCH   MPAC +3
0930                        7433  0 0006 1           EXTEND
0931   REF  27 LAST 989      7434  3 0117 0           DCA    VBUF +4
0932   REF 475 LAST 989      7435  52 152 0           DXCH   MPAC +5
0933   REF   8 LAST 988      7436  3 0130 0           CA     MATINC       INITIALIZE ADDRWD FOR NEXT DOT PRODUCT.
0934   REF  55 LAST 984      7437  26 106 1           ADS    ADDRWD       FORMS BASE ADDRESS OF NEXT COLUMN(ROW).

0935   REF   2 LAST 989      7440  0 7230 1           TC     DOTSUB
0936   REF  28 LAST 989      7441  52 113 0           DXCH   VBUF         MOVE GIVEN VECTOR BACK TO MPAC, SAVING Y
0937   REF 476 LAST 989      7442  52 145 0           DXCH   MPAC         COMPONENT OF ANSWER IN VBUF +2.
0938   REF  29 LAST 989      7443  52 115 0           DXCH   VBUF +2
0939   REF 477 LAST 989      7444  52 150 1           DXCH   MPAC +3
0940   REF  30 LAST 989      7445  52 117 1           DXCH   VBUF +4
0941   REF 478 LAST 989      7446  52 152 0           DXCH   MPAC +5
0942   REF   9 LAST 989      7447  3 0130 0           CA     MATINC       FORM ADDRESS OF LAST COLUMN OR ROW.
0943   REF  56 LAST 989      7450  26 106 1           ADS    ADDRWD

0944   REF   3 LAST 989      7451  0 7230 1           TC     DOTSUB
0945   REF  14 LAST 989      7452  52 124 1           DXCH   BUF2         ANSWER NOW COMPLETE, PUT COMPONENTS INTO
0946   REF 479 LAST 989      7453  52 145 0           DXCH   MPAC         PROPER MPAC REGISTERS.
0947   REF 480 LAST 989      7454  52 152 0           DXCH   MPAC +5
0948   REF  31 LAST 989      7455  52 115 0           DXCH   VBUF +2
0949   REF 481 LAST 989      7456  52 150 1           DXCH   MPAC +3
0950   REF  19 LAST 980      7457  1 6125 0           TCF    DANZIG       EXIT.
```

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P0951 VXSC - VECTOR TIMES SCALAR.

```
0952  REF  24 LAST 982   7460  10 153 1  VXSC     CCS   MODE      TEST PRESENT MODE.
0953  REF   1            7461  1 7507 0           TCF   DVXSC     SEPARATE ROUTINE WHEN SCALAR IS IN MPAC.
0954  REF   2 LAST 990   7462  1 7507 0           TCF   DVXSC

0955  REF   5 LAST 985   7463  0 7161 0  VVXSC    TC    DMPSUB    COMPUTE X COMPONENT
0956  REF   1            7464  0 7212 1           TC    VROUND    AND ROUND IT.
0957  RLF 482 LAST 989   7465  52 150 1           DXCH  MPAC +3   PUT Y COMPONENT INTO MPAC SAVING MPAC IN
0958  RLF 483 LAST 990   7466  52 145 0           DXCH  MPAC      MPAC +3.
0959  REF 484 LAST 990   7467  52 150 1           DXCH  MPAC +3

0960  REF   6 LAST 990   7470  0 7161 0           TC    DMPSUB    DO SAME FOR Y AND Z COMPONENTS.
0961  REF   2 LAST 990   7471  0 7212 1           TC    VROUND
0962  REF 485 LAST 990   7472  52 152 0           DXCH  MPAC +5
0963  REF 486 LAST 990   7473  52 145 0           DXCH  MPAC
0964  REF 487 LAST 990   7474  52 152 0           DXCH  MPAC +5

0965  REF   7 LAST 990   7475  0 7161 0           TC    DMPSUB
0966  REF   3 LAST 990   7476  0 7212 1           TC    VROUND
0967  REF 488 LAST 990   7477  52 145 0  VROTATEX DXCH  MPAC      EXIT USED TO RESTORE MPAC AFTER THIS
0968  REF 489 LAST 990   7500  52 152 0           DXCH  MPAC +5   TYPE OF ROTATION. CALLED BY VECTOR SHIFT
0969  REF 490 LAST 990   7501  52 150 1           DXCH  MPAC +3   RIGHT, V/SC, ETC.
0970  REF 491 LAST 990   7502  52 145 0           DXCH  MPAC
0971  REF  20 LAST 989   7503  1 6125 0           TCF   DANZIG
```

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P0972 DP VECTOR PROJECTION ROUTINE.

```
0973  REF   2 LAST 988   7504  0 7226 0  VPROJ   IC     PREDOT   (MPAC,X)MPAC IS COMPUTED AND LEFT IN
0974  REF  29 LAST 865   7505  4 7761 1           CS     FOUR     MPAC. DO DOT AND FALL INTO DVXSC.
0975  REF  57 LAST 989   7506 26 106  1           ADS    ADDRWD

R0976          VXSC WHEN SCALAR ARRIVES IN MPAC AND VECTOR IS AT X.

0977                      7507  0 0006 1  DVXSC   EXTEND
0978  REF 492 LAST 990    7510  3 0145 1           DCA    MPAC     SAVE SCALAR IN MPAC +3 AND GET X
0979  REF 493 LAST 991    7511 52 150  1           DXCH   MPAC +3  COMPONENT OF ANSWER.
0980  REF   8 LAST 990    7512  0 7161 0           IC     DMPSUB
0981  REF   4 LAST 990    7513  0 7212 1           IC     VROUND

0982  REF 100 LAST 988    7514  3 7762 0           CAF    TWO      ADVANCE ADDRWD TO Y COMPONENT OF X.
0983  REF  58 LAST 991    7515 26 106  1           ADS    ADDRWD
0984                      7516  0 0006 1           EXTEND
0985  REF 494 LAST 991    7517  3 0150 0           DCA    MPAC +3  PUT SCALAR BACK INTO MPAC AND SAVE
0986  REF 495 LAST 991    7520 52 145  0           DXCH   MPAC     X RESULT IN MPAC +5.
0987  REF 496 LAST 991    7521 52 152  0           DXCH   MPAC +5
0988  REF   9 LAST 991    7522  0 7161 0           IC     DMPSUB
0989  REF   5 LAST 991    7523  0 7212 1           IC     VROUND

0990  REF 101 LAST 991    7524  3 7762 0           CAF    TWO
0991  REF  59 LAST 991    7525 26 106  1           ADS    ADDRWD   TO Z COMPONENT.
0992  REF 497 LAST 991    7526 52 150  1           DXCH   MPAC +3  BRING SCALAR BACK, PUTTING Y RESULT IN
0993  REF 498 LAST 991    7527 52 145  0           DXCH   MPAC     THE PROPER PLACE.
0994  REF 499 LAST 991    7530 52 150  1           DXCH   MPAC +3
0995  REF  10 LAST 991    7531  0 7161 0           IC     DMPSUB
0996  REF   6 LAST 991    7532  0 7212 1           IC     VROUND

0997  REF 500 LAST 991    7533 52 145  0           DXCH   MPAC     PUT Z COMPONENT IN PROPER PLACE, ALSO
0998  REF 501 LAST 991    7534 52 152  0           DXCH   MPAC +5  POSITIONING X.
0999  REF 502 LAST 991    7535 52 145  0           DXCH   MPAC

1000  REF 165 LAST 978    7536  4 7763 0           CS     ONE      MODE HAS CHANGED TO VECTOR.
1001  REF   8 LAST 988    7537  1 6124 1           ICF    NEWMODE
```

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P1002 THE VECTOR CROSS PRODUCT ROUTINE CALCULATES (X M -X M ,X M -X M ,X M -X M) WHERE M IS THE VECTOR IN
R1004 3 2 2 3 1 3 3 1 2 1 1 2
R1006 MPAC AND X THE VECTOR AT THE GIVEN ADDRESS.

```
1007                        7540  0 0006 1  VXV     EXTEND
1008  REF 503 LAST 991      7541  3 0152 1          DCA     MPAC +5          FORM UP M3X1, LEAVING M1 IN VBUF.
1009  REF 504 LAST 992      7542  52 145 0          DXCH    MPAC
1010  REF  32 LAST 989      7543  52 113 0          DXCH    VBUF
1011  REF  11 LAST 991      7544  0 7161 0          TC      DMPSUB           BY X1.

1012                        7545  0 0006 1          EXTEND
1013  REF 505 LAST 992      7546  4 0150 1          DCS     MPAC +3          CALCULATE -X1M2, SAVING X1M3 IN VBUF +2.
1014  REF 506 LAST 992      7547  52 145 0          DXCH    MPAC
1015  REF  33 LAST 992      7550  52 115 0          DXCH    VBUF +2
1016  REF  12 LAST 992      7551  0 7161 0          TC      DMPSUB

1017  REF 102 LAST 991      7552  3 7762 0          CAF     TWO              ADVANCE ADDRWD TO X2.
1018  REF  60 LAST 991      7553  26 106 1          ADS     ADDRWD
1019                        7554  0 0006 1          EXTEND
1020  REF 507 LAST 992      7555  4 0152 0          DCS     MPAC +5          PREPARE TO GET -X2M3, SAVING -X1M2 IN
1021  REF 508 LAST 992      7556  52 145 0          DXCH    MPAC             MPAC +5.
1022  REF 509 LAST 992      7557  52 152 0          DXCH    MPAC +5
1023  REF  13 LAST 992      7560  0 7161 0          TC      DMPSUB

1024                        7561  0 0006 1          EXTEND
1025  REF  34 LAST 992      7562  3 0113 1          DCA     VBUF             GET X2M1, SAVING -X2M3 IN VBUF +4.
1026  REF 510 LAST 992      7563  52 145 0          DXCH    MPAC
1027  REF  35 LAST 992      7564  52 117 1          DXCH    VBUF +4
1028  REF  14 LAST 992      7565  0 7161 0          TC      DMPSUB

1029  REF 103 LAST 992      7566  3 7762 0          CAF     TWO              ADVANCE ADDRWD TO X3.
1030  REF  61 LAST 992      7567  26 106 1          ADS     ADDRWD
1031                        7570  0 0006 1          EXTEND
1032  REF  36 LAST 992      7571  4 0113 0          DCS     VBUF             GET -X3M1, ADDING X2M1 TO MPAC +5 TO
1033  REF 511 LAST 992      7572  52 145 0          DXCH    MPAC             COMPLETE THE Z COMPONENT OF THE ANSWER.
1034  REF 512 LAST 992      7573  20 152 0          DAS     MPAC +5

1035                        7574  0 0006 1          EXTEND
1036                        7575  1 7577 1          BZF     +2
1037  REF  10 LAST 979      7576  0 7101 0          TC      OVERFLOW
```

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```
1038  REF  15 LAST 992    7577  0 7161 0        TC     DMPSUB
1039  REF  37 LAST 992    7600  52 115 0        DXCH   VBUF +2        MOVE X1M3 TO MPAC +3 SETTING UP FOR X3M2
1040  REF 513 LAST 992    7601  52 150 1        DXCH   MPAC +3        AND ADD -X3M1 TO MPAC +3 TO COMPLETE THE
1041  REF 514 LAST 993    7602  52 145 0        DXCH   MPAC           Y COMPONENT OF THE RESULT.
1042  REF 515 LAST 993    7603  20 150 1        DAS    MPAC +3

1043                      7604  0 0006 1        EXTEND
1044                      7605  1 7607 0        BZF    +2
1045  REF  11 LAST 992    7606  0 7101 0        TC     OVERFLOW

1046  REF  16 LAST 993    7607  0 7161 0        TC     DMPSUB
1047  REF  38 LAST 993    7610  52 117 1        DXCH   VBUF +4        GO ADD -X2M3 TO X3M2 TO COMPLETE THE X
1048  REF   1             7611  1 7046 0        TCF    ENDVXV          COMPONENT (TAIL END OF DAD).

R1049          THE MPACVBUF SUBROUTINE SAVES THE VECTOR IN MPAC IN VBUF WITHOUT CLOBBERING MPAC.

1051                      7612  0 0006 1  MPACVBUF EXTEND              CALLED BY MXV, VXM, AND UNIT.
1052  REF 516 LAST 993    7613  3 0145 1        DCA    MPAC
1053  REF  39 LAST 993    7614  52 113 0        DXCH   VBUF
1054                      7615  0 0006 1        EXTEND
1055  REF 517 LAST 993    7616  3 0150 0        DCA    MPAC +3
1056  REF  40 LAST 993    7617  52 115 0        DXCH   VBUF +2
1057                      7620  0 0006 1        EXTEND
1058  REF 518 LAST 993    7621  3 0152 1        DCA    MPAC +5
1059  REF  41 LAST 993    7622  52 117 1        DXCH   VBUF +4
1060  REF 289 LAST 987    7623  0 0002 0        TC     Q               RETURN TO CALLER.
```

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P1061 INTERPRETIVE INSTRUCTIONS WHOSE EXECUTION CONSISTS OF PRINCIPALLY CALLING SUBROUTINES.

```
1063  REF  17 LAST 993    7624  0 7161 0  DMP1    IC     DMPSUB          DMP INSTRUCTION.
1064  REF  21 LAST 990    7625  1 6125 0           ICF    DANZIG

1065  REF  18 LAST 994    7626  0 7161 0  DMPR    IC     DMPSUB
1066  REF   1             7627  0 7211 1           IC     ROUNDSUB +1     (C(A) = +0).
1067  REF  22 LAST 994    7630  1 6125 0           ICF    DANZIG

1068                      7631  0 0006 1  DDV     EXTEND
1069  REF  62 LAST 992    7632  5 0106 0           INDEX  ADDRWD          MOVE DIVIDEND INTO BUF.
1070                      7633  3 0001 0           DCA    0
1071  REF   2 LAST 962    7634  1 7641 1           ICF    BDDV +4

1072                      7635  0 0006 1  BDDV    EXTEND                 MOVE DIVISOR INTO MPAC SAVING MPAC, THE
1073  REF  63 LAST 994    7636  5 0106 0           INDEX  ADDRWD          DIVIDEND, IN BUF.
1074                      7637  3 0001 0           DCA    0
1075  REF 519 LAST 993    7640  52 145 0           DXCH   MPAC
1076  REF  75 LAST 983    7641  52 121 1    +4     DXCH   BUF
1077  REF 270 LAST 988    7642  3 7767 0           CAF    ZERO            DIVIDE ROUTINES IN BANK 0.
1078  REF  21 LAST 975    7643  54 004 1           IS     FBANK
1079  REF   4 LAST 902    7644  1 2352 0           ICF    DDV/BDDV

1080  REF  64 LAST 994    7645  3 0106 0  SETPD   CA     ADDRWD          MUST SET TO WORK AREA, OR EBANK TROUBLE.
1081  REF  13 LAST 972    7646  54 156 1           IS     PUSHLOC
1082  REF   1             7647  1 6127 1           ICF    NOTBNKSW        NO FBANK SWITCH REQUIRED.

1083  REF 271 LAST 994    7650  3 7767 0  TSLC    CAF    ZERO            SHIFTING ROUTINES LOCATED IN BANK 00.
1084  REF  22 LAST 994    7651  54 004 1           IS     FBANK
1085  REF   1             7652  1 2172 0           ICF    TSLC2

1086  REF   6 LAST 954    7653  3 5342 1  GSHIFT  CAF    LOW7            USED AS MASK AT GENSHIFT. THIS PROCESSES
1087  REF  23 LAST 994    7654  54 004 1           IS     FBANK           ANY SHIFT INSTRUCTION (EXCEPT TSLC) WITH
1088  REF   1             7655  1 2214 0           ICF    GENSHIFT        AN ADDRESS (ROUTINES IN BANK 0).
```

P1089 THE FOLLOWING IS THE PROLOGUE TO V/SC. IF THE PRESENT MODE IS VECTOR, IT SAVES THE SCALAR AT X IN BUF
R1091 AND CALLS THE V/SC ROUTINE IN BANK 0. IF THE PRESENT MODE IS SCALAR, IT MOVES THE VECTOR AT X INTO MPAC, SAVING
R1093 THE SCALAR IN MPAC IN BUF BEFORE CALLING THE V/SC ROUTINE IN BANK 0.

```
1094   REF  25 LAST 990      7656  10 153 1  V/SC    CCS   MODE
1095   REF   1              7657  1 7670 0          TCF   DV/SC        MOVE VECTOR INTO MPAC.
1096   REF   2 LAST 995      7660  1 7670 0          TCF   DV/SC

1097                         7661  0 0006 1  VV/SC   EXTEND
1098   REF  65 LAST 994      7662  5 0106 0          INDEX ADDRWD
1099                         7663  3 0001 0          DCA   0
1100   REF  76 LAST 994      7664  52 121 1  V/SC1   DXCH  BUF          IN BOTH CASES, VECTOR IS NOW IN MPAC AND
1101   REF 272 LAST 994      7665  3 7767 0          CAF   ZERO         SCALAR IN BUF.
1102   REF  24 LAST 994      7666  54 004 1          TS    FBANK
1103   REF   1              7667  1 2630 1          TCF   V/SC2

1104                         7670  0 0006 1  DV/SC   EXTEND
1105   REF  66 LAST 995      7671  5 0106 0          INDEX ADDRWD
1106                         7672  3 0003 1          DCA   2
1107   REF 520 LAST 994      7673  52 150 1          DXCH  MPAC +3
1108                         7674  0 0006 1          EXTEND
1109   REF  67 LAST 995      7675  5 0106 0          INDEX ADDRWD
1110                         7676  3 0005 1          DCA   4
1111   REF 521 LAST 995      7677  52 152 0          DXCH  MPAC +5

1112   REF 166 LAST 991      7700  4 7763 0          CS    ONE          CHANGE MODE TO VECTOR.
1113   REF  26 LAST 995      7701  54 153 1          TS    MODE

1114                         7702  0 0006 1          EXTEND
1115   REF  68 LAST 995      7703  5 0106 0          INDEX ADDRWD
1116                         7704  3 0001 0          DCA   0
1117   REF 522 LAST 995      7705  52 145 0          DXCH  MPAC
1118   REF   1              7706  1 7664 0          TCF   V/SC1        FINISH PROLOGUE AT COMMON SECTION.
```

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P1119 SIGN AND COMPLEMENT INSTRUCTIONS.

```
1120  REF  69 LAST 995   7707  50 106 0  SIGN    INDEX   ADDRWD    CALL COMP INSTRUCTION IF WORD AT X IS
1121                     7710  10 000 0          CCS     0         NEGATIVE NON-ZERO.
1122  REF  23 LAST 994   7711  1 6125 0          ICF     DANZIG
1123                     7712  1 7714 0          ICF     +2
1124  REF   2 LAST 964   7713  1 7722 0          ICF     COMP      DO THE COMPLEMENT.

1125  REF  70 LAST 996   7714  50 106 0          INDEX   ADDRWD
1126                     7715  10 001 1          CCS     1
1127  REF  24 LAST 996   7716  1 6125 0          ICF     DANZIG
1128  REF  25 LAST 996   7717  1 6125 0          ICF     DANZIG
1129  REF   3 LAST 996   7720  1 7722 0          ICF     COMP
1130  REF  26 LAST 996   7721  1 6125 0          ICF     DANZIG
1131                     7722  0 0006 1  COMP    EXTEND              COMPLEMENT DP MPAC IN EVERY CASE.
1132  REF 523 LAST 995   7723  4 0145 0          DCS     MPAC
1133  REF 524 LAST 996   7724  52 145 0          DXCH    MPAC

1134  REF  27 LAST 995   7725  10 153 1          CCS     MODE      EITHER COMPLEMENT MPAC +3 OR THE REST OF
1135  REF   1            7726  1 7737 1          ICF     DCOMP     THE VECTOR ACCUMULATOR.
1136  REF   2 LAST 996   7727  1 7737 1          ICF     DCOMP

1137                     7730  0 0006 1          EXTEND              VECTOR COMPLEMENT.
1138  REF 525 LAST 996   7731  4 0150 1          DCS     MPAC +3
1139  REF 526 LAST 996   7732  52 150 1          DXCH    MPAC +3
1140                     7733  0 0006 1          EXTEND
1141  REF 527 LAST 996   7734  4 0152 0          DCS     MPAC +5
1142  REF 528 LAST 996   7735  52 152 0          DXCH    MPAC +5
1143  REF  27 LAST 996   7736  1 6125 0          ICF     DANZIG

1144  REF 529 LAST 996   7737  4 0146 0  DCOMP   CS      MPAC +2
1145  REF 530 LAST 996   7740  54 146 0          TS      MPAC +2
1146  REF  28 LAST 996   7741  1 6125 0          ICF     DANZIG
```

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P1147 CONSTANTS REQUIRED IN FIXED-FIXED.

```
1148                        7742  37777 1  DPOSMAX  OCT    37777
1149                        7743  37777 1  POSMAX   OCT    37777
1150  REF  53 LAST 986            7744     LIMITS   EQUALS POSMAX +1
1151                        7744  57777 1  NEG1/2   OCT    -20000      MUST BE TWO LOCATIONS AHEAD OF POS1/2.

1152                        7745  40000 0  BIT15    OCT    40000       BIT TABLE FOLLOWS.
1153                        7746  20000 0  BIT14    OCT    20000
1154                        7747  10000 0  BIT13    OCT    10000
1155                        7750  04000 0  BIT12    OCT    04000
1156                        7751  02000 0  BIT11    OCT    02000
1157                        7752  01000 0  BIT10    OCT    01000
1158                        7753  00400 0  BIT9     OCT    00400
1159                        7754  00200 0  BIT8     OCT    00200
1160                        7755  00100 0  BIT7     OCT    00100
1161                        7756  00040 0  BIT6     OCT    00040
1162                        7757  00020 0  BIT5     OCT    00020
1163                        7760  00010 0  BIT4     OCT    00010
1164                        7761  00004 0  BIT3     OCT    00004
1165                        7762  00002 0  BIT2     OCT    00002
1166                        7763  00001 0  BIT1     OCT    00001

1167  REF  38 LAST 953            7745     NEGMAX   EQUALS BIT15
1168  REF  50 LAST 870            7746     HALF     EQUALS BIT14
1169  REF  17 LAST 680            7746     POS1/2   EQUALS HALF
1170  REF  29 LAST 765            7747     QUARTER  EQUALS BIT13
1171  REF  39 LAST 755            7751     2K       EQUALS BIT11
1172                        7764  00013 0  ELEVEN   DEC    11
1173  REF   7 LAST 828            7764     NOUTCON  =      ELEVEN
1174  REF   3 LAST 278            4570     TEN      =      BINCON
1175  REF   4 LAST 279            4530     NINE     =      R2D1
1176  REF  48 LAST 864            7760     EIGHT    EQUALS BIT4
1177                        7765  00007 0  SEVEN    OCT    7
1178  REF   2 LAST 959            6306     SIX      EQUALS REVCNT
1179                        7766  00005 1  FIVE     OCT    5
1180  REF  24 LAST 890            7761     FOUR     EQUALS BIT3
1181  REF   1                     6311     THREE    EQUALS OCTAL3
1182  REF  33 LAST 845            7762     TWO      EQUALS BIT2
1183  REF  63 LAST 955            7763     ONE      EQUALS BIT1
1184                        7767  00000 1  ZERO     OCT    0
1185                        7770  77777 0  NEGO     OCT    77777
1186                        7771  77776 1  NEGONE   DEC    -1

1187  REF   8 LAST 965            7771     NEG1     =      NEGONE
1188  REF   7 LAST 865            7771     MINUS1   EQUALS NEG1

11885                             5336               BLOCK  02

1189                        5336  77775 1  NEG2     OCT    77775
```

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```
 11895                          5337   01777 1  LOW10    OCT     1777
 1190                           5340   77774 0  NEG3     DEC     -3
 1191                           5341   00777 0  LOW9     OCT     777
 11915                          5342   00177 0  LOW7     OCT     177
 1192                           5343   00017 1  LOW4     OCT     17
 1193   REF  17 LAST 888              7765     LOW3     EQUALS  SEVEN
 1194   REF  40 LAST 806              6311     LOW2     EQUALS  THREE

 1195                           5344   00032 0  CALLCODE OCT     00032
 1196                           5345   40014 0  DLOADCOD OCT     40014
 1197   REF  39 LAST 997              7745     VLOADCOD EQUALS  BIT15
 1198                           5346   40015 1  DLOAD*   OCT     40015
 1199   REF   2 LAST 741              6153     VLOAD*   EQUALS  OCT40001
 1200   REF  42 LAST 993       5347   00112 0  LVBUF    ADRES   VBUF
 1201   REF  11 LAST 851              5210     BIT13-14 =       PRIO30
R12011  THERE ARE FOUR POSSIBLE SETTINGS FOR CHANNEL 07 (WNAC1V) FOR ACCESSING THE EVENTUALLY THREE AND ONE-HALF
R12013  PRESENTLY ONE AND ONE-HALF SUPERBANKS.

 12014                          5350   00060 1  SUPER011 OCT      60          BITS FOR SUPERBNK SETTING 011
 120141 REF  38 LAST 713              7755     SUPER100 EQUALS  BIT7         BITS FOR SUPERBNK SETTING 100
A120142                                                                      (LAST 4K OF ROPE)
A120143                                      SUPER101 OCT     120          BITS FOR SUPERBNK SETTING 101
A120144                                                                      (FIRST 8K OF ACM)
A120145                                      SUPER110 OCT     140          BITS FOR SUPERBNK SETTING 110
A120146                                                                      (LAST 8K OF ACM)
 12015                          5351   74000 1  HIGH4    OCT     74000
 12016                          5352   01400 1  OCT1400  OCT     01400
 12017                          5353   00055 1  DEC45    DEC     45
```

```
P1203           THE FOLLOWING SHORT SHIFT CODES REQUIRE NO ADDRESS WORD:

R1204           1.  SR1 TO SR4          SCALAR SHIFT RIGHT.
R1205           2.  SR1R TO SR4R        SCALAR SHIFT RIGHT AND ROUND.
R1206           3.  SL1 TO SL4          SCALAR SHIFT LEFT.
R1207           4.  SL1R TO SL4R        SCALAR SHIFT LEFT AND ROUND.

R1208           5.  VSR1 TO VSR8        VECTOR SHIFT RIGHT (ALWAYS ROUNDS).
R1209           6.  VSL1 TO VSL8        VECTOR SHIFT LEFT (NEVER ROUNDS).

R1210           THE FOLLOWING CODES REQUIRE AN ADDRESS WHICH MAY BE INDEXED:*

R1211           1.  SR                  SCALAR SHIFT RIGHT.
R1212           2.  SRR                 SCALAR SHIFT RIGHT AND ROUND.
R1213           3.  SL                  SCALAR SHIFT LEFT.
R1214           4.  SLR                 SCALAR SHIFT LEFT AND ROUND.

R1215           5.  VSR                 VECTOR SHIFT RIGHT.
R1216           6.  VSL                 VECTOR SHIFT LEFT.

R1217   *  IF THE ADDRESS IS INDEXED, AND THE INDEX MODIFICATION RESULTS IN A NEGATIVE SHIFT COUNT, A SHIFT OF THE
R1219   ABSOLUTE VALUE OF THE COUNT IS DONE IN THE OPPOSITE DIRECTION.


 1220                                   00,2017                 BANK    00

 1221   REF  20 LAST 988        00,2017  3 6306 1  SHORTT       CAF     SIX             SCALAR SHORT SHIFTS COME HERE. THE SHIFT
 1222   REF  35 LAST 969        00,2020  7 0020 1                MASK    CYR             COUNT-1 IS NOW IN BITS 2-3 OF CYR. THE
 1223   REF  25 LAST 939        00,2021  54 021 0                TS      SR              ROUNDING BIT IS IN BIT1 AT THIS POINT.

 1224   REF  36 LAST 999        00,2022  10 020 1                CCS     CYR             SEE IF RIGHT OR LEFT SHIFT DESIRED.
 1225   REF   1                 00,2023  1 2101 1                ICF     TSSL            SHIFT LEFT.

 1226                           00,2024   00024 1  SRDDV        DEC     20              MPTEMP SETTING FOR SR BEFORE DDV.

 1227   REF  26 LAST 999        00,2025  50 021 1  TSSR        INDEX   SR              GET SHIFTING BIT.
 1228   REF  51 LAST 997        00,2026  3 7746 0                CAF     BIT14
 1229   REF  13 LAST 986        00,2027  54 125 0                TS      MPTEMP

 1230   REF  37 LAST 999        00,2030  10 020 1                CCS     CYR             SEE IF A ROUND IS DESIRED.
 1231   REF   1                 00,2031  0 2050 0  RIGHTR       IC      MPACSRND        YES - SHIFT RIGHT AND ROUND.
 1232   REF   9 LAST 991        00,2032  1 6124 1                ICF     NEWMODE         SET MODE TO DP (C(A) = 0).
 1233   REF  14 LAST 999        00,2033  3 0125 1  MPACSHR       CA      MPTEMP          DO A TRIPLE PRECISION SHIFT RIGHT.
 1234                           00,2034  0 0006 1                EXTEND
 1235   REF 531 LAST 996        00,2035  7 0146 0                MP      MPAC +2
 1236   REF 532 LAST 999        00,2036  54 146 0   +3           TS      MPAC +2         (EXIT FROM SQRT AND ABVAL).
 1237   REF  15 LAST 999        00,2037  3 0125 1                CA      MPTEMP
 1238                           00,2040  0 0006 1                EXTEND
 1239   REF 533 LAST 999        00,2041  7 0144 1                MP      MPAC            SHIFT MAJOR PART INTO A,L AND PLACE IN
```

```
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1240    REF 534 LAST 999    00,2042  52 145 0          DXCH   MPAC          MPAC,,+1.
1241    REF  16 LAST 999    00,2043  3 0125 1          CA     MPTEMP
1242                        00,2044  0 0006 1          EXTEND
1243    REF 170 LAST 987    00,2045  7 0001 1          MP     L              ORIGINAL C(MPAC +1).
1244    REF 535 LAST1000    00,2046  20 146 0          DAS    MPAC +1        GUARANTEED NO OVERFLOW.
1245    REF  29 LAST 996    00,2047  1 6125 0          ICF    DANZIG

R1246           MPAC SHIFT RIGHT AND ROUND SUBROUTINES.

1247    REF 536 LAST1000    00,2050  3 0146 1  MPACSRND CA     MPAC +2        WE HAVE TO DO ALL THREE MULTIPLIES SINCE
1248                        00,2051  0 0006 1          EXTEND                 MPAC +1 AND MPAC +2 MIGHT HAVE SIGN
1249    REF  17 LAST1000    00,2052  7 0125 0          MP     MPTEMP          DISAGREEMENT WITH A SHIFT RIGHT OF 1.
1250    REF 537 LAST1000    00,2053  56 145 1          XCH    MPAC +1
1251                        00,2054  0 0006 1          EXTEND
1252    REF  18 LAST1000    00,2055  7 0125 0          MP     MPTEMP
1253    REF 538 LAST1000    00,2056  56 145 1          XCH    MPAC +1        TRIAL MINOR PART.
1254    REF 171 LAST1000    00,2057  6 0001 0          AD     L

1255                        00,2060  6 0000 1  VSHR2    DOUBLE                (FINISH VECTOR COMPONENT SHIFT RIGHT
1256    REF 539 LAST1000    00,2061  54 146 0          TS     MPAC +2        AND ROUND.
1257                        00,2062  1 2064 0          ICF    +2
1258    REF 540 LAST1000    00,2063  26 145 0          ADS    MPAC +1        GUARANTEED NO OVERFLOW.

1259    REF 273 LAST 995    00,2064  3 7767 0          CAF    ZERO
1260    REF 541 LAST1000    00,2065  54 146 0          TS     MPAC +2
1261    REF 542 LAST1000    00,2066  56 144 0          XCH    MPAC           SETTING TO ZERO SO FOLLOWING DAS WORKS.
1262                        00,2067  0 0006 1          EXTEND
1263    REF  19 LAST1000    00,2070  7 0125 0          MP     MPTEMP
1264    REF 543 LAST1000    00,2071  20 145 0          DAS    MPAC           AGAIN NO OVERFLOW.
1265    REF 290 LAST 993    00,2072  0 0002 0          IC     Q

1266    REF  20 LAST1000    00,2073  3 0125 1  VSHRRND  CA     MPTEMP         ENTRY TO SHIFT RIGHT AND ROUND MPAC WHEN
1267                        00,2074  0 0006 1          EXTEND                 MPAC CONTAINS A VECTOR COMPONENT.
1268    REF 544 LAST1000    00,2075  7 0145 0          MP     MPAC +1
1269    REF 545 LAST1000    00,2076  54 145 0          TS     MPAC +1
1270    REF 172 LAST1000    00,2077  56 001 0          XCH    L
1271    REF   1             00,2100  1 2060 1          ICF    VSHR2          GO ADD ONE IF NECESSARY AND FINISH.
```

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P1272 ROUTINE FOR SHORT SCALAR SHIFT LEFT (AND MAYBE ROUND).

```
1273  REF  27 LAST 999     00,2101  3 0021 1  TSSL    CA    SR        GET SHIFT COUNT FOR SR.
1274  REF  21 LAST1000    00,2102  54 125 0   +1      TS    MPTEMP
1275                       00,2103  0 0006 1   +2      EXTEND
1276  REF 546 LAST1000    00,2104  3 0146 1           DCA   MPAC +1   ENTRY HERE FROM SL FOR SCALARS.
1277  REF 547 LAST1001    00,2105  20 146 0           DAS   MPAC +1   SHIFTING LEFT ONE PLACE AT A TIME IS
1278  REF 548 LAST1001    00,2106  6 0144 0           AD    MPAC      FASTER THAN DOING THE WHOLE SHIFT WITH
1279  REF 549 LAST1001    00,2107  6 0144 0           AD    MPAC      MULTIPLIES ASSUMING THAT FREQUENCY OF
1280  REF 550 LAST1001    00,2110  54 144 1           TS    MPAC      SHIFT COUNTS GOES DOWN RAPIDLY AS A
1281                       00,2111  1 2113 1           ICF   +2        FUNCTION OF THEIR MAGNITUDE.
1282  REF  18 LAST 983    00,2112  54 111 1           TS    OVFIND    OVERFLOW. (LEAVES OVERFLOW-CORRECTED
A1283                                                                RESULT ANYWAY).
1284  REF  22 LAST1001    00,2113  10 125 0           CCS   MPTEMP    LOOP ON DECREMENTED SHIFT COUNT.
1285  REF   2 LAST 999    00,2114  1 2102 1           ICF   TSSL +1
1286  REF  38 LAST 999    00,2115  10 020 1           CCS   CYR       SEE IF ROUND WANTED.
1287  REF   2 LAST 994    00,2116  0 7210 0   ROUND   TC    ROUNDSUB  YES - ROUND AND EXIT.
1288  REF  30 LAST1000    00,2117  1 6125 0           TCF   DANZIG    SL LEAVES A ZERO IN CYR FOR NO ROUND.
1289  REF  31 LAST1001    00,2120  1 6125 0           TCF   DANZIG    NO - EXIT IMMEDIATE
```

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P1290 VECTOR SHIFTING ROUTINES.

```
1291  REF   1                 00,2121  3 7765 1  SHORTV   CAF     LOW3        SAVE 3 BIT SHIFT COUNT - 1 WITHOUT
1292  REF  39 LAST1001        00,2122  7 0020 1            MASK    CYR         EDITING CYR.
1293  REF  23 LAST1001        00,2123  54 125 0            TS      MPTEMP
1294  REF  40 LAST1002        00,2124  10 020 1            CCS     CYR         SEE IF LEFT OR RIGHT SHIFT.
1295  REF   1                 00,2125  1 2145 1            ICF     VSSL        VECTOR SHIFT LEFT.
1296                          00,2126   00176 1  OCT176    OCT     176         USED IN PROCESSED SHIFTS WITH - COUNT.

1297  REF  24 LAST1002        00,2127  50 125 1  VSSR      INDEX   MPTEMP      (ENTRY FROM SR). PICK UP SHIFTING BIT.
1298  REF  52 LAST 999        00,2130  3 7746 0            CAF     BIT14       MPTEMP CONTAINS THE SHIFT COUNT - 1.
1299  REF  25 LAST1002        00,2131  54 125 0            TS      MPTEMP
1300  REF   1                 00,2132  0 2073 1            IC      VSHRRND     SHIFT X COMPONENT.

1301  REF 551 LAST1001        00,2133  52 145 0            DXCH    MPAC        SWAP X AND Y COMPONENTS.
1302  REF 552 LAST1002        00,2134  52 150 1            DXCH    MPAC +3
1303  REF 553 LAST1002        00,2135  52 145 0            DXCH    MPAC
1304  REF   2 LAST1002        00,2136  0 2073 1            IC      VSHRRND     SHIFT Y COMPONENT.

1305  REF 554 LAST1002        00,2137  52 145 0            DXCH    MPAC        SWAP Y AND Z COMPONENTS.
1306  REF 555 LAST1002        00,2140  52 152 0            DXCH    MPAC +5
1307  REF 556 LAST1002        00,2141  52 145 0            DXCH    MPAC
1308  REF   3 LAST1002        00,2142  0 2073 1            IC      VSHRRND     SHIFT Z COMPONENT.

1309  REF   1                 00,2143  1 7477 0            ICF     VROTATEX    RESTORE COMPONENTS TO PROPER PLACES.
```

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P1310 VECTOR SHIFT LEFT - DONE ONE PLACE AT A TIME.

```
 1311   REF  26 LAST1002     00,2144  54 125 0   -1      TS      MPTEMP          SHIFTING LOOP.

 1312                        00,2145  0 0006 1   VSSL    EXTEND
 1313   REF 557 LAST1002     00,2146  3 0145 1           DCA     MPAC
 1314   REF 558 LAST1003     00,2147  20 145 0           DAS     MPAC
 1315                        00,2150  0 0006 1           EXTEND
 1316                        00,2151  1 2153 0           BZF     +2
 1317   REF  12 LAST 993     00,2152  0 7101 0           TC      OVERFLOW

 1318                        00,2153  0 0006 1           EXTEND
 1319   REF 559 LAST1003     00,2154  3 0150 0           DCA     MPAC +3
 1320   REF 560 LAST1003     00,2155  20 150 1           DAS     MPAC +3
 1321                        00,2156  0 0006 1           EXTEND
 1322                        00,2157  1 2161 1           BZF     +2
 1323   REF  13 LAST1003     00,2160  0 7101 0           TC      OVERFLOW

 1324                        00,2161  0 0006 1           EXTEND
 1325   REF 561 LAST1003     00,2162  3 0152 1           DCA     MPAC +5
 1326   REF 562 LAST1003     00,2163  20 152 0           DAS     MPAC +5
 1327                        00,2164  0 0006 1           EXTEND
 1328                        00,2165  1 2167 1           BZF     +2
 1329   REF  14 LAST1003     00,2166  0 7101 0           TC      OVERFLOW

 1330   REF  27 LAST1003     00,2167  10 125 0           CCS     MPTEMP          LOOP ON DECREMENTED SHIFT COUNTER.
 1331   REF   2 LAST1002     00,2170  1 2144 0           TCF     VSSL -1
 1332   REF  32 LAST1001     00,2171  1 6125 0           TCF     DANZIG          EXIT.
```

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P1333 TSLC - TRIPLE SHIFT LEFT AND COUNT. SHIFTS MPAC LEFT UNTIL GREATER THAN .5 IN MAGNITUDE, LEAVING
R1335 THE COMPLEMENT OF THE NUMBER OF SHIFTS REQUIRED IN X.

```
1336  REF  28 LAST1003   00,2172  54 125 0  TSLC2     TS     MPTEMP     START BY ZEROING SHIFT COUNT (IN A NOW).
1337  REF   2 LAST 986   00,2173  0 7001 1             TC     BRANCH     EXIT WITH NO SHIFTING IF ARGUMENT ZERO.
1338                     00,2174  1 2176 1             TCF    +2
1339  REF   1            00,2175  1 2212 0             TCF    ENDTSLC    STORES ZERO SHIFT COUNT IN THIS CASE.

1340  REF   9 LAST 740   00,2176  0 7327 0             TC     TPAGREE    MAY CAUSE UPSHIFT OF ONE EXTRA PLACE.

1341  REF 563 LAST1003   00,2177  3 0144 0             CA     MPAC       BEGIN NORMALIZATION LOOP.
1342  REF   1            00,2200  1 2207 1             TCF    TSLCTEST

1343  REF  29 LAST1004   00,2201  24 125 1  TSLCLOOP  INCR   MPTEMP     INCREMENT SHIFT COUNTER.
1344                     00,2202  0 0006 1             EXTEND
1345  REF 564 LAST1004   00,2203  3 0146 1             DCA    MPAC +1
1346  REF 565 LAST1004   00,2204  20 146 0             DAS    MPAC +1
1347  REF 566 LAST1004   00,2205  6 0144 0             AD     MPAC
1348  REF 567 LAST1004   00,2206  26 144 1             ADS    MPAC
1349                     00,2207  6 0000 1  TSLCTEST  DOUBLE              SEE IF (ANOTHER) SHIFT IS REQUIRED.
1350                     00,2210  54 000 0             DVSK
1351  REF   1            00,2211  1 2201 1             TCF    TSLCLOOP   YES - INCREMENT COUNT AND SHIFT AGAIN.

1352  REF  30 LAST1004   00,2212  4 0125 0  ENDTSLC   CS     MPTEMP
1353  REF   1            00,2213  1 6701 0             TCF    STORE1     STORE SHIFT COUNT AND RETURN TO DANZIG.
```

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```
P1354           THE FOLLOWING ROUTINES PROCESSES THE GENERAL SHIFT INSTRUCTIONS SR, SRR, SL, AND SLR.
R1356   THE GIVEN ADDRESS IS DECODED AS FOLLOWS:

R1357           BITS 1-7    SHIFT COUNT (SUBADDRESS) LESS THAN 125 DECIMAL.
R1358           BIT 8       PSEUDO SIGN BIT (DETECTS CHANGE IN SIGN IN INDEXED SHIFTS).
R1360           BIT 9       0 FOR LEFT SHIFT, AND 1 FOR RIGHT SHIFT.
R1361           BIT 10      1 FOR TERMINAL ROUND ON SCALAR SHIFTS, 0 OTHERWISE.
R1362           BITS 11-13  0.
R13625          BIT 14      1.
R13627          BIT 15      0.

R1363   THE ABOVE ENCODING IS DONE BY THE YUL SYSTEM.


 1364   REF  71 LAST 996    00,2214  7 0106 1  GENSHIFT MASK    ADDRWD      GET SHIFT COUNT, TESTING FOR ZERO.
 1365   REF 331 LAST 986    00,2215  10 000 0           CCS     A           (ARRIVES WITH C(A) = LOW7).
 1366   REF   1             00,2216  1 2224 0           TCF     GENSHFT2    IF NON-ZERO, PROCEED WITH DECREMENTED CT

 1367   REF  45 LAST 866    00,2217  3 7752 0           CAF     BIT10       ZERO SHIFT COUNT. NO SHIFTS NEEDED BUT
 1368   REF  72 LAST1005    00,2220  7 0106 1           MASK    ADDRWD      WE MIGHT HAVE TO ROUND MPAC ON SLR AND
 1369   REF 332 LAST1005    00,2221  10 000 0           CCS     A           SRR (SCALAR ONLY).
 1370   REF   3 LAST1001    00,2222  0 7210 0           TC      ROUNDSUB
 1371   REF  33 LAST1003    00,2223  1 6125 0           TCF     DANZIG

 1372   REF  31 LAST1004    00,2224  54 125 0  GENSHFT2 TS      MPTEMP      DECREMENTED SHIFT COUNT TO MPTEMP.
 1373   REF  34 LAST 951    00,2225  3 7754 0           CAF     BIT8        TEST MEANING OF LOW SEVEN BIT COUNT IN
 1374                       00,2226  0 0006 1           EXTEND              MPTEMP NOW.
 1375   REF  73 LAST1005    00,2227  7 0106 1           MP      ADDRWD
 1376   REF   1             00,2230  7 6311 0           MASK    LOW2        JUMPS ON SHIFT DIRECTION (BIT8) AND
 1377   REF 333 LAST1005    00,2231  50 000 1           INDEX   A
 1378                       00,2232  1 2233 0           TCF     +1          ORIGINAL SHIFT DIRECTION (BIT 9).
 1379   REF   1             00,2233  1 2332 0           TCF     RIGHT-      NEGATIVE SHIFT COUNT FOR SL OR SLR.
 1380   REF   1             00,2234  1 2341 1           TCF     LEFT        SL OR SLR.
 1381   REF   1             00,2235  1 2336 1           TCF     LEFT-       NEGATIVE SHIFT COUNT WITH SR OR SRR.
```

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P1382 GENERAL SHIFT RIGHT.

```
1383  REF  28 LAST 996    00,2236  10 153 1  RIGHT    CCS    MODE      SEE IF VECTOR OR SCALAR.
1384  REF   1             00,2237  1 2277 0           TCF    GENSCR
1385  REF   2 LAST1006    00,2240  1 2277 0           TCF    GENSCR

1386  REF  32 LAST1005    00,2241  3 0125 1           CA     MPTEMP    SEE IF SHIFT COUNT LESS THAN 14D.
1387  REF   1             00,2242  6 3710 1  VRIGHT2  AD     NEG12
1388                      00,2243  0 0006 1           EXTEND
1389  REF   1             00,2244  6 2127 1           BZMF   VSSR      IF SO, BRANCH AND SHIFT IMMEDIATELY.

1390  REF   9 LAST 997    00,2245  6 7771 1           AD     NEGONE    IF NOT, REDUCE MPTEMP BY A TOTAL OF 14,
1391  REF  33 LAST1006    00,2246  54 125 0           TS     MPTEMP    AND DO A SHIFT RIGHT AND ROUND BY 14.
1392  REF 274 LAST1000    00,2247  3 7767 0           CAF    ZERO      THE ROUND AT THIS STAGE MAY INTRODUCE A
1393  REF 173 LAST1000    00,2250  54 001 1           TS     L         ONE BIT ERROR IN A SHIFT RIGHT 15D.
1394  REF 568 LAST1004    00,2251  56 144 0           XCH    MPAC
1395  REF 569 LAST1006    00,2252  56 145 1           XCH    MPAC +1
1396  REF   1             00,2253  0 2272 1           TC     SETROUND  X COMPONENT NOW SHIFTED, SO MAKE UP THE
1397  REF 570 LAST1006    00,2254  20 145 0           DAS    MPAC      ROUNDING QUANTITY (0 IN A AND 0 OR +-1
A1398                                                               IN L).
1399  REF 571 LAST1006    00,2255  56 147 0           XCH    MPAC +3   REPEAT THE ABOVE PROCESS FOR Y AND Z.
1400  REF 572 LAST1006    00,2256  56 150 0           XCH    MPAC +4
1401  REF   2 LAST1006    00,2257  0 2272 1           TC     SETROUND
1402  REF 573 LAST1006    00,2260  20 150 1           DAS    MPAC +3   NO OVERFLOW ON THESE ADDS.

1403  REF 574 LAST1006    00,2261  56 151 1           XCH    MPAC +5
1404  REF 575 LAST1006    00,2262  56 152 1           XCH    MPAC +6
1405  REF   3 LAST1006    00,2263  0 2272 1           TC     SETROUND
1406  REF 576 LAST1006    00,2264  20 152 0           DAS    MPAC +5

1407  REF  34 LAST1006    00,2265  10 125 0           CCS    MPTEMP    SEE IF DONE, DOING FINAL DECREMENT.
1408  REF  35 LAST1006    00,2266  54 125 0           TS     MPTEMP
1409  REF   1             00,2267  1 2242 0           TCF    VRIGHT2
1410                      00,2270  04604 1  BIASLO    DEC    .2974 B-1 SQRT CONSTANT

1411  REF  34 LAST1005    00,2271  1 6125 0           TCF    DANZIG

1412                      00,2272  6 0000 1  SETROUND DOUBLE             MAKES UP ROUNDING QUANTITY FROM ARRIVING
1413  REF 577 LAST1006    00,2273  54 146 0           TS     MPAC +2   C(A). L IS ZERO INITIALLY.
1414  REF 275 LAST1006    00,2274  3 7767 0           CAF    ZERO
1415  REF 174 LAST1006    00,2275  56 001 0           XCH    L
1416  REF 291 LAST1000    00,2276  0 0002 0           TC     Q         RETURN AND DO THE DAS, RESETTING L TO 0.
```

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P1417 PROCESS SR AND SRR FOR SCALARS.

```
1418  REF  36 LAST1006   00,2277  3 0125 1  GENSCR  CA    MPTEMP    SEE IF THE ORIGINAL SHIFT COUNT WAS LESS
1419  REF   2 LAST1006   00,2300  6 3710 1    +1     AD    NEG12     THAN 14D.
1420                     00,2301  0 0006 1           EXTEND
1421  REF   1            00,2302  6 2322 0           BZMF  DOSSHFT   DO THE SHIFT IMMEDIATELY IF SO.

1422  REF  10 LAST1006   00,2303  6 7771 1    +4     AD    NEGONE    IF NOT, DECREMENT SHIFT COUNT BY 14D AND
1423  REF  37 LAST1007   00,2304  54 125 0           TS    MPTEMP    SHIFT MPAC RIGHT 14 PLACES.
1424  REF 276 LAST1006   00,2305  3 7767 0           CAF   ZERO
1425  REF 578 LAST1006   00,2306  56 144 0          XCH   MPAC
1426  REF 579 LAST1007   00,2307  56 145 1          XCH   MPAC +1
1427  REF 580 LAST1007   00,2310  54 146 0          TS    MPAC +2
1428  REF  38 LAST1007   00,2311  10 125 0          CCS   MPTEMP    SEE IF FINISHED, DO FINAL DECREMENT.
1429  REF  39 LAST1007   00,2312  54 125 0          TS    MPTEMP
1430  REF   3 LAST1006   00,2313  0 2300 0          TC    GENSCR +1
1431                     00,2314   22650 1  SLOPEHI  DEC   .5884     SQRT CONSTANT.
1432  REF  46 LAST1005   00,2315  3 7752 0           CAF   BIT10     FINISHED WITH SHIFT. SEE IF ROUND
1433  REF  74 LAST1005   00,2316  7 0106 1           MASK  ADDRWD    WANTED.
1434  REF 334 LAST1005   00,2317  10 000 0          CCS   A
1435  REF   4 LAST1005   00,2320  0 7210 0          TC    ROUNDSUB
1436  REF  35 LAST1006   00,2321  1 6125 0          TCF   DANZIG    DO SO AND/OR EXIT.

1437  REF  40 LAST1007   00,2322  50 125 1  DOSSHFT  INDEX MPTEMP    PICK UP SHIFTING BIT.
1438  REF  53 LAST1002   00,2323  3 7746 0           CAF   BIT14
1439  REF  41 LAST1007   00,2324  54 125 0          TS    MPTEMP
1440  REF  47 LAST1007   00,2325  3 7752 0          CAF   BIT10     SEE IF TERMINAL ROUND DESIRED.
1441  REF  75 LAST1007   00,2326  7 0106 1          MASK  ADDRWD
1442  REF 335 LAST1007   00,2327  10 000 0          CCS   A
1443  REF   1            00,2330  1 2031 0          TCF   RIGHTR    YES.
1444  REF   1            00,2331  1 2033 1          TCF   MPACSHR   JUST SHIFT RIGHT.
```

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P1445 PROCESS THE RIGHT- (SL(R) WITH A NEGATIVE COUNT), LEFT-, AND LEFT OPTIONS.

```
1447  REF  42 LAST1007   00,2332  4 0125 0  RIGHT-   CS     MPTEMP    GET ABSOLUTE VALUE - 1 OF SHIFT COUNT
1448  REF   1            00,2333  6 2126 0           AD     OCT176    UNDERSTANDING THAT BIT8 (PSEUDO-SIGN)
1449  REF  43 LAST1008   00,2334  54 125 0           TS     MPTEMP    WAS 1 INITIALLY.
1450  REF   1            00,2335  1 2236 0           ICF    RIGHT     DO NORMAL SHIFT RIGHT.

1451  REF  44 LAST1008   00,2336  4 0125 0  LEFT-    CS     MPTEMP    SAME PROLOGUE TO LEFT FOR INDEXED RIGHT
1452  REF   2 LAST1008   00,2337  6 2126 0           AD     OCT176    SHIFTS WHOSE NET SHIFT COUNT IS NEGATIVE
1453  REF  45 LAST1008   00,2340  54 125 0           TS     MPTEMP

1454  REF  29 LAST1006   00,2341  10 153 1  LEFT     CCS    MODE      SINCE LEFT SHIFTING IS DONE ONE PLACE AT
1455  REF   1            00,2342  1 2345 0           ICF    GENSCL    A TIME, NO COMPARISON WITH 14 NEED BE
1456  REF   2 LAST1008   00,2343  1 2345 0           ICF    GENSCL    DONE. FOR SCALARS, SEE IF TERMINAL ROUND
1457  REF   3 LAST1003   00,2344  1 2145 1           ICF    VSSL      DESIRED. FOR VECTORS, SHIFT IMMEDIATELY.

1458  REF  45 LAST 861   00,2345  3 7756 1  GENSCL   CAF    BIT6      PUT ROUNDING BIT (BIT10 OF ADDRWD) INTO
1459                     00,2346  0 0006 1           EXTEND           BIT 15 OF CYR WHERE THE ROUNDING BIT OF
1460  REF  76 LAST1007   00,2347  7 0106 1           MP     ADDRWD    A SHORT SHIFT LEFT WOULD BE.
1461  REF  41 LAST1002   00,2350  54 020 1           TS     CYR
1462  REF   3 LAST1001   00,2351  1 2103 0           ICF    TSSL +2   DO THE SHIFT.
```

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P1463 SCALAR DIVISION INSTRUCTIONS, DDV AND BDDV, ARE EXECUTED HERE. AT THIS POINT, THE DIVIDEND IS IN MPAC
R1465 AND THE DIVISOR IN BUF.

```
1466  REF 167 LAST 995   00,2352  4 7763 0  DDV/BDDV CS    ONE       INITIALIZATION.
1467  REF   1            00,2353  54 126 0            TS    DVSIGN    +-1 FOR POSITIVE QUOTIENT - -0 FOR NEG.
1468  REF   1            00,2354  54 127 1            TS    DVNORMCT  DIVIDEND NORMALIZATION COUNT.
1469  REF   1            00,2355  54 130 1            TS    MAXDVSW   NEAR-ONE DIVIDE FLAG.

1470  REF  77 LAST 995   00,2356  10 120 0            CCS   BUF       FORCE BUF POSITIVE WITH THE MAJOR PART
1471  REF   1            00,2357  1 3712 1            TCF   BUFPOS    NON-ZERO.
1472                     00,2360  1 2362 0            TCF   +2
1473  REF   1            00,2361  1 3725 0            TCF   BUFNEG

14731 REF 581 LAST1007   00,2362  54 146 0  BUFZERO   TS    MPAC +2   ZERO THIS.
14732 REF  10 LAST1004   00,2363  0 7327 0            TC    TPAGREE   FORCE SIGN AGREEMENT BEFORE OVERFLOW

14733 REF 582 LAST1009   00,2364  10 144 1            CCS   MPAC      TEST TO SEE IF MPAC NON-ZERO.  (TOO BIG)
14734 REF   1            00,2365  1 2412 0            TCF   OVF+     MAJOR PART OF DIVIDEND IS POSITIVE NON-0
14735                    00,2366  1 2370 0            TCF   +2
14736 REF   2 LAST1009   00,2367  1 2411 0            TCF   OVF+ -1   MAJOR PART OF DIVIDEND IS NEG. NON-ZERO

1474  REF  78 LAST1009   00,2370  56 121 0            XCH   BUF +1    SHIFT DIVIDEND AND DIVISOR LEFT 14.
1475  REF  79 LAST1009   00,2371  56 120 1            XCH   BUF
1476  REF 583 LAST1009   00,2372  56 145 1            XCH   MPAC +1
1477  REF 584 LAST1009   00,2373  56 144 0            XCH   MPAC
1481  REF  80 LAST1009   00,2374  10 120 0            CCS   BUF       TRY AGAIN ON FORMER MINOR PART.
1482  REF   1            00,2375  1 2420 1            TCF   BUF+
1483                     00,2376  1 2400 0            TCF   +2        OVERFLOW ON ZERO DIVISOR.
1484  REF   1            00,2377  1 2414 0            TCF   BUF-

14841 REF 585 LAST1009   00,2400  4 0144 1            CS    MPAC      SIGN OF MPAC DETERMINES SIGN OF RESULT.
14842                    00,2401  0 0006 1  SGNDVOVF  EXTEND
14843                    00,2402  6 2404 0            BZMF  +2
14844 REF   2 LAST1009   00,2403  24 126 1            INCR  DVSIGN    NEGMAX IN MPAC PERHAPS.
1485  REF  54 LAST 997   00,2404  3 7743 0  DVOVF     CAF   POSMAX    ON DIVISION OVERFLOW OF ANY SORT, SET
1486  REF 586 LAST1009   00,2405  54 144 1            TS    MPAC      SET UP MPAC TO +-POSMAX.
1487  REF   1            00,2406  0 2604 1            TC    FINALDV +3
1488  REF 168 LAST1009   00,2407  3 7763 1            CAF   ONE       SET OVERFLOW INDICATOR AND EXIT.
1489  REF   1            00,2410  1 7153 0            TCF   SETOVF

14891 REF   3 LAST1009   00,2411  24 126 1  -1        INCR  DVSIGN
14892 REF  81 LAST1009   00,2412  4 0121 1  OVF+      CS    BUF +1    LOAD LOWER ORDER PART OF DIVISOR.
14893 REF   1            00,2413  1 2401 1            TCF   SGNDVOVF  GET SIGN OF RESULT.

1490                     00,2414  0 0006 1  BUF-      EXTEND          IF BUF IS NEGATIVE, COMPLEMENT IT AND
1491  REF  82 LAST1009   00,2415  4 0121 1            DCS   BUF       MAINTAIN DVSIGN FOR FINAL QUOTIENT SIGN.
1492  REF  83 LAST1009   00,2416  52 121 1            DXCH  BUF
1493  REF   4 LAST1009   00,2417  24 126 1            INCR  DVSIGN    NOW -0.

1494  REF 587 LAST1009   00,2420  10 144 1  BUF+      CCS   MPAC      FORCE MPAC POSITIVE, CHECKING FOR ZERO
```

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```
1495  REF   1                00,2421  1 2435 0          TCF    MPAC+        DIVIDEND IN THE PROCESS.
1496                         00,2422  1 2424 0          TCF    +2
1497  REF   1                00,2423  1 2431 1          TCF    MPAC-
1498  REF 588 LAST1009       00,2424  10 145 0          CCS    MPAC +1
1499  REF   2 LAST1010       00,2425  1 2435 0          TCF    MPAC+
1500  REF  36 LAST1007       00,2426  1 6125 0          TCF    DANZIG       EXIT IMMEDIATELY ON ZERO DIVIDEND.
1501  REF   2 LAST1010       00,2427  1 2431 1          TCF    MPAC-
1502  REF  37 LAST1010       00,2430  1 6125 0          TCF    DANZIG

1503                         00,2431  0 0006 1  MPAC-    EXTEND              FORCE MPAC POSITIVE AS BUF IN BUF-.
1504  REF 589 LAST1010       00,2432  4 0145 0          DCS    MPAC
1505  REF 590 LAST1010       00,2433  52 145 0          DXCH   MPAC
1506  REF   5 LAST1009       00,2434  24 126 1          INCR   DVSIGN       NOW +1 OR -0.
```

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1507	REF 591 LAST1010	00,2435	4 0144 1	MPAC+	CS	MPAC	CHECK FOR DIVISION OVERFLOW. IF THE
1508	REF 11 LAST1007	00,2436	6 7771 1		AD	NEGUNE	MAJOR PART OF THE DIVIDEND IS LESS THAN
1509	REF 84 LAST1009	00,2437	6 0120 1		AD	BUF	THE MAJOR PART OF THE DIVISOR BY AT
1510	REF 336 LAST1007	00,2440	10 000 0		CCS	A	LEAST TWO, WE CAN PROCEED IMMEDIATELY
1511	REF 1	00,2441	1 2503 1		TCF	DVNORM	WITHOUT NORMALIZATION PRODUCING A DVMAX.
1512		00,2442	60001 0	-1/2+2	DEC	60001	USED IN SQRTSUB.
1513		00,2443	1 2444 0		TCF	+1	IF THE ABOVE DOES NOT HOLD, FORCE SIGN
1514	REF 18 LAST 997	00,2444	3 7746 0		CAF	HALF	AGREEMENT IN NUMERATOR AND DENOMINATOR
1515		00,2445	6 0000 1		DOUBLE		TO FACILITATE OVERFLOW AND NEAR-ONE
1516	REF 592 LAST1011	00,2446	6 0145 1		AD	MPAC +1	CHECKING.
1517	REF 593 LAST1011	00,2447	54 145 0		TS	MPAC +1	
1518	REF 277 LAST1007	00,2450	3 7767 0		CAF	ZERO	
1519	REF 55 LAST1009	00,2451	6 7743 0		AD	POSMAX	
1520	REF 594 LAST1011	00,2452	26 144 1		ADS	MPAC	
1521	REF 19 LAST1011	00,2453	3 7746 0		CAF	HALF	SAME FOR BUF.
1522		00,2454	6 0000 1		DOUBLE		
1523	REF 85 LAST1011	00,2455	6 0121 0		AD	BUF +1	
1524	REF 86 LAST1011	00,2456	54 121 1		TS	BUF +1	
1525	REF 278 LAST1011	00,2457	3 7767 0		CAF	ZERO	
1526	REF 56 LAST1011	00,2460	6 7743 0		AD	POSMAX	
1527	REF 87 LAST1011	00,2461	26 120 0		ADS	BUF	
1528	REF 595 LAST1011	00,2462	4 0144 1		CS	MPAC	CHECK MAGNITUDE OF SIGN-CORRECTED
1529	REF 88 LAST1011	00,2463	6 0120 1		AD	BUF	OPERANDS.
1530	REF 337 LAST1011	00,2464	10 000 0		CCS	A	
1531	REF 2 LAST1011	00,2465	1 2503 1		TCF	DVNORM	DIVIDE OK - WILL NOT BECOME MAXDV CASE.
1532	REF 15 LAST 989	00,2466	00123 1	LBUF2	ADRES	BUF2	
1533	REF 1	00,2467	1 2404 1		TCF	DVOVF	DIVISOR NOT LESS THAN DIVIDEND - OVF.
1534	REF 2 LAST1009	00,2470	54 130 1		TS	MAXDVSW	IF THE MAJOR PARTS OF THE DIVIDEND AND
1535	REF 596 LAST1011	00,2471	4 0145 0		CS	MPAC +1	DIVISOR ARE EQUAL, A SPECIAL APPROXIMA-
1536	REF 89 LAST1011	00,2472	6 0121 0		AD	BUF +1	TION IS USED (PROVIDED THE DIVISION IS
1537		00,2473	0 0006 1		EXTEND		POSSIBLE, OF COURSE).
1538	REF 2 LAST1011	00,2474	6 2404 0		BZMF	DVOVF	
1539	REF 3 LAST1011	00,2475	1 2503 1		TCF	DVNORM	IF NO OVERFLOW.

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```
1540                        00,2476  0 0006 1  BUFNORM  EXTEND
1541  REF   2 LAST1009     00,2477  24 127 0           AUG     DVNORMCT   ADD -1 TO AUGMENT SHIFT COUNT AND SHIFT
1542                        00,2500  0 0006 1           EXTEND             LEFT ONE PLACE.
1543  REF  90 LAST1011     00,2501  3 0121 0           DCA     BUF
1544  REF  91 LAST1012     00,2502  20 121 1           DAS     BUF

1545  REF  92 LAST1012     00,2503  3 0120 1  DVNORM   CA      BUF        SEE IF DIVISOR NORMALIZED YET.
1546                        00,2504  6 0000 1           DOUBLE
1547                        00,2505  54 000 0           DVSK
1548  REF   1               00,2506  1 2476 1           TCF     BUFNORM    NO - SHIFT LEFT ONE AND TRY AGAIN.

1549  REF 597 LAST1011      00,2507  52 145 0           DXCH    MPAC       CALL DIVIDEND NORMALIZATION SEQUENCE
1550  REF   3 LAST1012      00,2510  50 127 0           INDEX   DVNORMCT   PRIOR TO DOING THE DIVIDE.
1551  REF   1               00,2511  0 2541 0           TC      MAXTEST

1552  REF 598 LAST1012      00,2512  54 146 0           IS      MPAC +2    RETURNS WITH DIVISION DONE AND C(A) = 0.
1553  REF  38 LAST1010      00,2513  1 6125 0           TCF     DANZIG
```

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P1554 THE FOLLOWING ARE PROLOGUES TO SHIFT THE DIVIDEND ARRIVING IN A AND L BEFORE THE DIVIDE.

1556	REF	28	LAST1001	00,2514	22 021 1	-21D	LXCH	SR	SPECIAL PROLOGUE FOR UNIT WHEN THE
1557				00,2515	0 0006 1		EXTEND		LENGTH OF THE ARGUMENT WAS NOT LESS THAN
1558	REF	20	LAST1011	00,2516	7 7746 1		MP	HALF	.5. IN THIS CASE, EACH COMPONENT MUST BE
1559	REF	175	LAST1006	00,2517	56 001 0		XCH	L	SHIFTED RIGHT ONE TO PRODUCE A HALF-UNIT
1560	REF	29	LAST1013	00,2520	6 0021 1		AD	SR	VECTOR.
1561	REF	176	LAST1013	00,2521	56 001 0		XCH	L	
1562	REF	1		00,2522	1 2545 0		ICF	GENDDV +1	WITH DP DIVIDEND IN A,L.
1563				00,2523	20 001 1		DDOUBL		PROLOGUE WHICH NORMALIZES THE DIVIDEND
1564				00,2524	20 001 1		DDOUBL		WHEN IT IS KNOWN THAT NO DIVISION
1565				00,2525	20 001 1		DDOUBL		OVERFLOW WILL OCCUR.
1566				00,2526	20 001 1		DDOUBL		
1567				00,2527	20 001 1		DDOUBL		
1568				00,2530	20 001 1		DDOUBL		
1569				00,2531	20 001 1		DDOUBL		
1570				00,2532	20 001 1		DDOUBL		
1571				00,2533	20 001 1		DDOUBL		
1572				00,2534	20 001 1		DDOUBL		
1573				00,2535	20 001 1		DDOUBL		
1574				00,2536	20 001 1		DDOUBL		
1575				00,2537	20 001 1		DDOUBL		
1576	REF	599	LAST1012	00,2540	52 145 0		DXCH	MPAC	
1577	REF	3	LAST1011	00,2541	10 130 1	MAXTEST	CCS	MAXDVSW	0 IF MAJORS MIGHT BE =, -1 OTHERWISE.
1578				00,2542	06552 0	BIASHI	DEC	.4192 B-1	SQRT CONSTANTS
1579	REF	1		00,2543	1 2616 0		ICF	MAXDV	CHECK TO SEE IF THEY ARE NOW EQUAL.

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P1580 THE FOLLOWING IS A GENERAL PURPOSE DOUBLE PRECISION DIVISION ROUTINE. IT DIVIDES MPAC BY BUF AND LEAVES
R1582 THE RESULT IN MPAC. THE FOLLOWING CONDITIONS MUST BE SATISFIED:

R1583 1. THE DIVISOR (BUF) MUST BE POSITIVE AND NOT LESS THAN .5.

R1584 2. THE DIVIDEND (MPAC) MUST BE POSITIVE WITH THE MAJOR PART OF MPAC STRICTLY LESS THAN THAT OF BUF
R1586 (A SPECIAL APPROXIMATION, MAXDV, IS USED WHEN THE MAJOR PARTS ARE EQUAL).

R1588 UNDERSTANDING THAT A/B = Q + S(R/B) WHERE S = 2(-14) AND Q AND R ARE QUOTIENT AND REMAINDER, RESPEC-
R1590 TIVELY, THE FOLLOWING APPROXIMATION IS OBTAINED BY MULTIPLYING ABOVE AND BELOW BY C - SD AND NEGLECTING TERMS OF
R1592 ORDER S-SQUARED (POSSIBLY INTRODUCING ERROR INTO THE LOW TWO BITS OF THE RESULT). SIGN AGREEMENT IS UNNECESSARY.

R1594 A + SB . (R - QD) A + SB
R1596 ------ = Q + S(------) WHERE Q AND R ARE QUOTIENT AND REMAINDER OF ------ RESPECTIVELY.
R1598 C + SD (C) C

```
1600  REF 600 LAST1013   00,2544  52 145 0  GENDDV  DXCH   MPAC      WE NEED A AND B ONLY FOR FIRST DV.
1601                     00,2545  0 0006 1   +1      EXTEND          (SPECIAL UNIT PROLOGUE ENTERS HERE).
1602  REF  93 LAST1012   00,2546  10 120 0           DV     BUF       A NOW CONTAINS Q AND L, R.
1603  REF 601 LAST1014   00,2547  52 145 0           DXCH   MPAC

1604  REF 602 LAST1014   00,2550  4 0144 1           CS     MPAC      FORM DIVIDEND FOR MINOR PART OF RESULT.
1605                     00,2551  0 0006 1           EXTEND
1606  REF  94 LAST1014   00,2552  7 0121 1           MP     BUF +1
1607  REF 603 LAST1014   00,2553  6 0145 1           AD     MPAC +1   OVERFLOW AT THIS POINT IS POSITIVE SINCE
1608                     00,2554  54 000 0           OVSK             R IS POSITIVE IN EVERY CASE.
1609                     00,2555  1 2562 0           TCF    +5

1610                     00,2556  0 0006 1           EXTEND           OVERFLOW CAN BE REMOVED BY SUBTRACTING C
1611  REF  95 LAST1014   00,2557  60 120 1           SU     BUF       (BUF) ONCE SINCE R IS ALWAYS LESS THAN C
1612  REF 604 LAST1014   00,2560  24 144 0           INCR   MPAC      IN THIS CASE. INCR COMPENSATES SUBTRACT.
1613  REF   1            00,2561  1 2564 0           TCF    +DOWN     (SINCE C(A) IS STILL POSITIVE).

1614                     00,2562  0 0006 1   +5      EXTEND
1615  REF   1            00,2563  6 2574 0           BZMF   -UP       C(A) CAN BE MADE LESS THAN C IN MAGNI-
A1616                                                               TUDE BY DIMINISHING IT BY C (SINCE C IS
                                                                    NOT LESS THAN .5) UNLESS C(A) = 0.
```

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```
1617                    00,2564  0 0006 1  +DOWN    EXTEND
1618  REF  96 LAST1014  00,2565  60 120 1           SU      BUF         IF POSITIVE, REDUCE ONLY IF NECESSARY
1619                    00,2566  0 0006 1           EXTEND              SINCE THE COMPENSATING INCR MIGHT CAUSE
1620                    00,2567  1 2572 1           BZF     +3          OVERFLOW.
1621                    00,2570  0 0006 1           EXTEND              DONT SUBTRACT UNLESS RESULT IS POSITIVE
1622  REF   1           00,2571  6 2600 0           BZMF    ENDMAXDV    OR ZERO.

1623  REF 605 LAST1014  00,2572  24 144 0  +3      INCR    MPAC        KEEP SUBTRACT HERE AND COMPENSATE.
1624  REF   2 LAST1009  00,2573  1 2601 0           TCF     FINALDV

1625                    00,2574  0 0006 1  -UP      EXTEND              IF ZERO, SET MINOR PART OF RESULT TO
1626  REF   3 LAST1015  00,2575  1 2604 0           BZF     FINALDV +3  ZERO.

1627                    00,2576  0 0006 1           EXTEND              IF NEGATIVE, ADD C TO A, SUBTRACTING ONE
1628  REF 606 LAST1015  00,2577  26 144 1           DIM     MPAC        TO COMPENSATE. DIM IS OK HERE SINCE THE
1629  REF  97 LAST1015  00,2600  6 0120 1  ENDMAXDV AD      BUF         MAJOR PART NEVER GOES NEGATIVE.
```

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```
1630                          00,2601  22 007 0  FINALDV  ZL                DO DV TO OBTAIN MINOR PART OF RESULT.
1631                          00,2602  0 0006 1           EXTEND
1632  REF  98 LASI1015        00,2603  10 120 0           DV       BUF
1633  REF 607 LASI1015        00,2604  54 145 0  +3       IS       MPAC +1

1634  REF   6 LASI1010        00,2605  10 126 0           CCS      DVSIGN   LEAVE RESULT POSITIVE UNLESS C(DVSIGN)=
1635  REF 292 LASI1006        00,2606  0 0002 0           TC       Q        -0.
1636  REF 293 LASI1016        00,2607  0 0002 0           TC       Q
1637  REF 294 LASI1016        00,2610  0 0002 0           TC       Q

1638                          00,2611  0 0006 1           EXTEND
1639  REF 608 LASI1016        00,2612  4 0145 0           DCS      MPAC
1640  REF 609 LASI1016        00,2613  52 145 0          DXCH     MPAC
1641  REF 279 LASI1011        00,2614  3 7767 0           CAF      ZERO     SO WE ALWAYS RETURN WITH C(A) = 0.
1642  REF 295 LASI1016        00,2615  0 0002 0           TC       Q
```

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P1643 IF THE MAJOR PARTS OF THE DIVISOR AND DIVIDEND ARE EQUAL, BUT THE MINOR PARTS ARE SUCH THAT THE
R1645 DIVIDEND IS STRICTLY LESS THAN THE DIVISOR IN MAGNITUDE, THE FOLLOWING APPROXIMATION IS USED. THE ASSUMPTIONS
R1647 ARE THE SAME AS THE GENERAL ROUTINE WITH THE ADDITION THAT SIGN AGREEMENT IS NECESSARY (B, C, & D POSITIVE).

$$\frac{C + SB}{C + SD} = 37777 + S\left(\frac{B - D}{C}\right)$$

R1652 THE DIVISION MAY BE PERFORMED IMMEDIATELY SINCE B IS STRICTLY LESS THAN D AND C IS NOT LESS THAN .5.

```
1654   REF 610 LAST1016    00,2616  4 0144 1  MAXDV   CS    MPAC      SEE IF MAXDV CASE STILL HOLDS AFTER
1655   REF  99 LAST1016    00,2617  6 0120 1          AD    BUF       NORMALIZATION.
1656                       00,2620  0 0006 1          EXTEND
1657                       00,2621  1 2623 0          BZF   +2
1658   REF   2 LAST1013    00,2622  1 2544 1          TCF   GENDDV    MPAC NOW LESS THAN BUF = DIVIDE AS USUAL

1659   REF  57 LAST1011    00,2623  3 7743 0  +2      CAF   POSMAX    SET MAJOR PART OF RESULT.
1660   REF 611 LAST1017    00,2624  54 144 1          TS    MPAC

1661   REF 100 LAST1017    00,2625  4 0121 1          CS    BUF +1    FORM DIVIDEND OF MINOR PART OF RESULT.
1662   REF 612 LAST1017    00,2626  6 0145 1          AD    MPAC +1
1663   REF   2 LAST1015    00,2627  1 2600 1          TCF   ENDMAXDV  GO ADD C AND DO DIVIDE, ATTACHING SIGN
A1664                                                               BEFORE EXITING.
```

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P1665 VECTOR DIVIDED BY SCALAR, V/SC, IS EXECUTED HERE. THE VECTOR IS NOW IN MPAC WITH SCALAR IN BUF.

```
1667  REF 169 LAST1009   00,2630  4 7763 0  V/SC2   CS    ONE          INITIALIZE DIVIDEND NORMALIZATION COUNT
1668  REF   4 LAST1012   00,2631  54 127 1          TS    DVNORMCT     AND DIVISION SIGN REGISTER.
1669  REF  43 LAST 998   00,2632  54 117 1          TS    VBUF +5

1670  REF 101 LAST1017   00,2633  10 120 0          CCS   BUF          FORCE DIVISOR POSITIVE WITH MAJOR PART
1671  REF   1            00,2634  1 2671 1          TCF   /BUF+        NON-ZERO (IF POSSIBLE).
1672                     00,2635  1 2637 0          TCF   +2
1673  REF   1            00,2636  1 2665 1          TCF   /BUF-

1674  REF 102 LAST1018   00,2637  56 121 0          XCH   BUF +1       SHIFT VECTOR AND SCALAR LEFT 14.
1675  REF 103 LAST1018   00,2640  56 120 1          XCH   BUF
1676  REF 613 LAST1017   00,2641  56 145 1          XCH   MPAC +1
1677  REF 614 LAST1018   00,2642  56 144 0          XCH   MPAC
1678                     00,2643  0 0006 1          EXTEND             CHECK FOR OVERFLOW IN EACH CASE.
1679                     00,2644  1 2646 0          BZF   +2
1680  REF   3 LAST1011   00,2645  1 2404 1          TCF   DVOVF

1681  REF 615 LAST1018   00,2646  56 150 0          XCH   MPAC +4
1682  REF 616 LAST1018   00,2647  56 147 0          XCH   MPAC +3
1683                     00,2650  0 0006 1          EXTEND
1684                     00,2651  1 2653 1          BZF   +2
1685  REF   4 LAST1018   00,2652  1 2404 1          TCF   DVOVF

1686  REF 617 LAST1018   00,2653  56 152 1          XCH   MPAC +6
1687  REF 618 LAST1018   00,2654  56 151 1          XCH   MPAC +5
1688                     00,2655  0 0006 1          EXTEND
1689                     00,2656  1 2660 1          BZF   +2
1690  REF   5 LAST1018   00,2657  1 2404 1          TCF   DVOVF

1691  REF 104 LAST1018   00,2660  10 120 0          CCS   BUF
1692  REF   2 LAST1018   00,2661  1 2671 1          TCF   /BUF+
1693  REF   6 LAST1018   00,2662  1 2404 1          TCF   DVOVF        ZERO DIVISOR = OVERFLOW.
1694  REF   2 LAST1018   00,2663  1 2665 1          TCF   /BUF-
1695  REF   7 LAST1018   00,2664  1 2404 1          TCF   DVOVF

1696                     00,2665  0 0006 1  /BUF-    EXTEND             ON NEGATIVE, COMPLEMENT BUF AND MAINTAIN
1697  REF 105 LAST1018   00,2666  4 0121 1          DCS   BUF          DVSIGN IN VBUF +5.
1698  REF 106 LAST1018   00,2667  52 121 1          DXCH  BUF
1699  REF  44 LAST1018   00,2670  24 117 0          INCR  VBUF +5
```

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```
1700  REF  21 LAST1013   00,2671  3 7746 0  /BUF+   CAF    HALF      FORCE SIGN AGREEMENT IN DIVISOR.
1701                     00,2672  6 0000 1           DOUBLE
1702  REF 107 LAST1018   00,2673  6 0121 0           AD     BUF +1
1703  REF 108 LAST1019   00,2674  54 121 1           TS     BUF +1
1704  REF 280 LAST1016   00,2675  3 7767 0           CAF    ZERO
1705  REF  58 LAST1017   00,2676  6 7743 0           AD     POSMAX
1706  REF 109 LAST1019   00,2677  26 120 0           ADS    BUF

1707  REF  16 LAST1011   00,2700  56 123 1           XCH    BUF2      LEAVE ABS(ORIGINAL DIVISOR) IN BUF2 FOR
1708  REF 110 LAST1019   00,2701  3 0121 0           CA     BUF +1    OVERFLOW TESTING.
1709  REF  17 LAST1019   00,2702  54 124 1           TS     BUF2 +1
1710  REF   1            00,2703  1 2711 0           TCF    /NORM     NORMALIZE DIVISOR IN BUF.

1711                     00,2704  0 0006 1  /NORM2   EXTEND           IF LESS THAN .5, AUGMENT DVNORMCT AND
1712  REF   5 LAST1018   00,2705  24 127 0           AUG    DVNORMCT  DOUBLE DIVISOR.
1713                     00,2706  0 0006 1           EXTEND
1714  REF 111 LAST1019   00,2707  3 0121 0           DCA    BUF
1715  REF 112 LAST1019   00,2710  20 121 1           DAS    BUF

1716  REF 113 LAST1019   00,2711  3 0120 1  /NORM    CA     BUF       SEE IF DIVISOR NORMALIZED.
1717                     00,2712  6 0000 1           DOUBLE
1718                     00,2713  54 000 0           DVSK
1719  REF   1            00,2714  1 2704 1           TCF    /NORM2    DOUBLE AND TRY AGAIN IF NOT.

1720  REF   1            00,2715  0 2727 1           TC     V/SCDV    DO X COMPONENT DIVIDE.
1721  REF 619 LAST1018   00,2716  52 150 1           DXCH   MPAC +3   SUPPLY ARGUMENTS IN USUAL SEQUENCE.
1722  REF 620 LAST1019   00,2717  52 145 0           DXCH   MPAC
1723  REF 621 LAST1019   00,2720  52 150 1           DXCH   MPAC +3

1724  REF   2 LAST1019   00,2721  0 2727 1           TC     V/SCDV    Y COMPONENT.
1725  REF 622 LAST1019   00,2722  52 152 0           DXCH   MPAC +5
1726  REF 623 LAST1019   00,2723  52 145 0           DXCH   MPAC
1727  REF 624 LAST1019   00,2724  52 152 0           DXCH   MPAC +5

1728  REF   3 LAST1019   00,2725  0 2727 1           TC     V/SCDV    Z COMPONENT.
1729  REF   2 LAST1002   00,2726  1 7477 0           TCF    VROTATEX  GO RE-ARRANGE COMPONENTS BEFORE EXIT.
```

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P1730 SUBROUTINE USED BY V/SC TO DIVIDE VECTOR COMPONENT IN MPAC+1 BY THE SCALAR GIVEN IN BUF.

```
1732  REF  45 LAST1018   00,2727  3 0117 0  V/SCDV   CA     VBUF +5      REFLECTS SIGN OF SCALAR.
1733  REF   7 LAST1016   00,2730  54 126 0           TS     DVSIGN

1734  REF 625 LAST1019   00,2731  10 144 1           CCS    MPAC         FORCE MPAC POSITIVE, EXITING ON ZERO.
1735  REF   1            00,2732  1 2746 1           TCF    /MPAC+
1736                     00,2733  1 2735 0           TCF    +2
1737  REF   1            00,2734  1 2742 0           TCF    /MPAC-

1738  REF 626 LAST1020   00,2735  10 145 0           CCS    MPAC +1
1739  REF   2 LAST1020   00,2736  1 2746 1           TCF    /MPAC+
1740  REF 296 LAST1016   00,2737  0 0002 0           TC     Q
1741  REF   2 LAST1020   00,2740  1 2742 0           TCF    /MPAC-
1742  REF 297 LAST1020   00,2741  0 0002 0           TC     Q

1743                     00,2742  0 0006 1  /MPAC-   EXTEND                USUAL COMPLEMENTING AND SETTING OF SIGN.
1744  REF 627 LAST1020   00,2743  4 0145 0           DCS    MPAC
1745  REF 628 LAST1020   00,2744  52 145 0           DXCH   MPAC
1746  REF   8 LAST1020   00,2745  24 126 1           INCR   DVSIGN

1747  REF 170 LAST1018   00,2746  4 7763 0  /MPAC+   CS     ONE          INITIALIZE NEAR-ONE SWITCH.
1748  REF   4 LAST1013   00,2747  54 130 1           TS     MAXDVSW

1749  REF 629 LAST1020   00,2750  4 0144 1           CS     MPAC         CHECK POSSIBLE OVERFLOW.
1750  REF  18 LAST1019   00,2751  6 0123 1           AD     BUF2         UNNORMALIZED INPUT DIVISOR.
1751                     00,2752  0 0006 1           EXTEND
1752  REF   1            00,2753  6 2757 0           BZMF   /AGREE       CHECK FOR NEAR-ONE OR OVERFLOW.

1753  REF 630 LAST1020   00,2754  52 145 0  DDVCALL   DXCH   MPAC         CALL PRE-DIVIDE NORMALIZATION.
1754  REF   6 LAST1019   00,2755  50 127 0           INDEX  DVNORMCT
1755  REF   2 LAST1012   00,2756  1 2541 1           TCF    MAXTEST
```

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```
1756  REF  22 LAST1019   00,2757  3 7746 0  /AGREE   CAF     HALF        FORCE SIGN AGREEMENT IN DIVIDEND
1757                     00,2760  6 0000 1            DOUBLE              (ALREADY DONE FOR DIVISOR).
1758  REF 631 LAST1020   00,2761  6 0145 1            AD      MPAC +1
1759  REF 632 LAST1021   00,2762  54 145 0            TS      MPAC +1
1760  REF 281 LAST1019   00,2763  3 7767 0            CAF     ZERO
1761  REF  59 LAST1019   00,2764  6 7743 0            AD      POSMAX
1762  REF 633 LAST1021   00,2765  26 144 1            ADS     MPAC

1763  REF 634 LAST1021   00,2766  4 0144 1            CS      MPAC        CHECK TO SEE IF OVERFLOW GONE OR IF
1764  REF  19 LAST1020   00,2767  6 0123 1            AD      BUF2        NEAR-ONE CASE IS PRESENT.
1765  REF 338 LAST1011   00,2770  10 000 0            CCS     A
1766  REF   1            00,2771  1 2754 1            TCF     DDVCALL     NOT NEAR-ONE.
1767                     00,2772   32506 0  SLOPELO   DEC     .8324
1768  REF   8 LAST1018   00,2773  1 2404 1            TCF     DVOVF       NO HOPE.

1769  REF   5 LAST1020   00,2774  54 130 1            TS      MAXDVSW     SIGNAL POSSIBLE NEAR-ONE CASE.
1770  REF 635 LAST1021   00,2775  4 0145 0            CS      MPAC +1     SEE IF DIVISION CAN BE DONE.
1771  REF  20 LAST1021   00,2776  6 0124 0            AD      BUF2 +1
1772                     00,2777  0 0006 1            EXTEND
1773  REF   9 LAST1021   00,3000  6 2404 0            BZMF    DVOVF
1774  REF   2 LAST1021   00,3001  1 2754 1            TCF     DDVCALL     GOING TO MAXDV.
```

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P1775 THE FOLLOWING ROUTINE EXECUTES THE UNIT INSTRUCTION, WHICH TAKES THE UNIT OF THE VECTOR IN MPAC.

```
1777  REF   2 LASI 989    00,3002  0 7612 0  UNIT    IC     MPACVBUF   SAVE THE ARGUMENT IN VBUF.
1778  REF 282 LAST1021    00,3003  3 7767 0          CAF    ZERO       MUST SENSE OVERFLOW IN FOLLOWING DOT.
1779  REF  19 LAST1001    00,3004  56 111 0          XCH    OVFIND
1780  REF   4 LASI  20    00,3005  54 131 0          IS     TEM1
1781  REF   1             00,3006  0 3301 0          IC     VSQSUB     DOT MPAC WITH ITSELF.
1782  REF   5 LAST1022    00,3007  3 0131 1          CA     TEM1
1783  REF  20 LAST1022    00,3010  56 111 0          XCH    OVFIND
1784                      00,3011  0 0006 1          EXTEND
1785                      00,3012  1 3014 0          BZF    +2
1786  REF  10 LAST1021    00,3013  1 2404 1          TCF    DVOVF
1787                      00,3014  0 0006 1          EXTEND
1788  REF 636 LAST1021    00,3015  3 0145 1          DCA    MPAC       LEAVE THE SQUARE OF THE LENGTH OF THE
1789  REF  41 LASI 975    00,3016  50 110 1          INDEX  FIXLOC     ARGUMENT IN LVSQUARE.
1790  REF   1             00,3017  52 043 1          DXCH   LVSQUARE

1791  REF   1             00,3020  0 3325 0          IC     SQRTSUB    GO TAKE THE NORMALIZED SQUARE ROOT.

1792  REF 637 LAST1022    00,3021  10 144 1          CCS    MPAC       CHECK FOR UNIT OVERFLOW.
1793                      00,3022  1 3027 0          TCF    +5         MPAC IS NOT LESS THAN .5 UNLESS
1794  REF 177 LAST1013    00,3023  54 001 1          IS     L
1795  REF  42 LAST1022    00,3024  50 110 1          INDEX  FIXLOC
1796  REF   3 LASI 734    00,3025  52 045 1          DXCH   LV
1797  REF  11 LAST1022    00,3026  1 2404 1          TCF    DVOVF      INPUT TO SQRTSUB WAS 0.

1798  REF   1             00,3027  4 3130 1          CS     FOURTEEN   SEE IF THE INPUT WAS SO SMALL THE THE
1799  REF  46 LAST1008    00,3030  6 0125 1          AD     MPTEMP     FIRST TWO REGISTERS OF THE SQUARE WERE 0
1800  REF 339 LAST1021    00,3031  10 000 0          CCS    A
1801                      00,3032  4 0000 0          COM                IF SO, SAVE THE NEGATIVE OF THE SHIFT
1802  REF   1             00,3033  1 3111 1          TCF    SMALL      COUNT -15D.

1803  REF   1             00,3034  1 3043 1          TCF    LARGE      (THIS IS USUALLY THE CASE.)

1804  REF   1             00,3035  4 3127 1          CS     THIRTEEN   IF THE SHIFT COUNT WAS EXACTLY 14, SET
1805  REF  47 LAST1022    00,3036  54 125 0          IS     MPTEMP     THE PRE-DIVIDE NORM COUNT TO -13D.

1806  REF 638 LAST1022    00,3037  3 0144 0          CA     MPAC       SHIFT THE LENGTH RIGHT 14 BEFORE STORING
1807  REF 178 LAST1022    00,3040  54 001 1  SMALL2  IS     L          (SMALL EXITS TO THIS POINT).
1808  REF 283 LAST1022    00,3041  3 7767 0          CAF    ZERO
1809  REF   1             00,3042  1 3070 1          TCF    LARGE2     GO TO STORE LENGTH AND PROCEED.

1810  REF  48 LAST1022    00,3043  10 125 0  LARGE   CCS    MPTEMP     MOST ALL CASES COME HERE.
1811  REF   1             00,3044  1 3052 1          TCF    LARGE3     SEE IF NO NORMALIZATION WAS REQUIRED BY

1812  REF   1             00,3045  4 2024 1          CS     SRDDV      SQRT, AND IF SO, SET UP FOR A SHIFT
1813  REF  49 LAST1022    00,3046  54 125 0          IS     MPTEMP     RIGHT 1 BEFORE DIVIDING TO PRODUCE
1814                      00,3047  0 0006 1          EXTEND             THE DESIRED HALF UNIT VECTOR.
1815  REF 639 LAST1022    00,3050  3 0145 1          DCA    MPAC
1816  REF   2 LAST1022    00,3051  1 3070 1          TCF    LARGE2
```

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```
1817                          00,3052  4 0000 0  LARGE3  COM
1818   REF  50 LAST1022       00,3053  54 125 0          TS      MPTEMP      LEAVE NEGATIVE OF SHIFT COUNT-1 FOR
                                                                             PREDIVIDE LEFT SHIFT.

1819                          00,3054  4 0000 0          COM
1820   REF 340 LAST1022       00,3055  50 000 1          INDEX   A           PICK UP REQUIRED SHIFTING BIT TO UNNORM-
1821   REF  54 LAST1007       00,3056  3 7746 0          CAF     BIT14       ALIZE THE SQRT RESULT.
1822   REF 114 LAST1019       00,3057  54 120 0          TS      BUF
1823                          00,3060  0 0006 1          EXTEND
1824   REF 640 LAST1022       00,3061  7 0145 0          MP      MPAC +1
1825   REF 115 LAST1023       00,3062  56 120 1          XCH     BUF
1826                          00,3063  0 0006 1          EXTEND              (UNNORMALIZE THE SQRT FOR LV).
1827   REF 641 LAST1023       00,3064  7 0144 1          MP      MPAC
1828   REF 179 LAST1022       00,3065  56 001 0          XCH     L
1829   REF 116 LAST1023       00,3066  6 0120 1          AD      BUF
1830   REF 180 LAST1023       00,3067  56 001 0          XCH     L

1831   REF  43 LAST1022       00,3070  50 110 1  LARGE2  INDEX   FIXLOC
1832   REF   4 LAST1022       00,3071  52 045 1          DXCH    LV          LENGTH NOW STORED IN WORK AREA.

1833   REF 171 LAST1020       00,3072  4 7763 0          CS      ONE
1834   REF   6 LAST1021       00,3073  54 130 1          TS      MAXDVSW     NO MAXDV CASES IN UNIT.

1835   REF  46 LAST1020       00,3074  52 113 0          DXCH    VBUF        PREPARE X COMPONENT FOR DIVIDE, SETTING
1836   REF 642 LAST1023       00,3075  52 145 0          DXCH    MPAC        LENGTH OF VECTOR AS DIVISOR IN BUF.
1837   REF 117 LAST1023       00,3076  52 121 1          DXCH    BUF
1838   REF   1                00,3077  0 3131 1          TC      UNITDV

1839   REF  47 LAST1023       00,3100  52 115 0          DXCH    VBUF +2     DO Y AND Z IN USUAL FASHION SO WE CAN
1840   REF 643 LAST1023       00,3101  52 145 0          DXCH    MPAC        EXIT THROUGH VROTATEX.
1841   REF 644 LAST1023       00,3102  52 150 1          DXCH    MPAC +3
1842   REF   2 LAST1023       00,3103  0 3131 1          TC      UNITDV

1843   REF  48 LAST1023       00,3104  52 117 1          DXCH    VBUF +4
1844   REF 645 LAST1023       00,3105  52 145 0          DXCH    MPAC
1845   REF 646 LAST1023       00,3106  52 152 0          DXCH    MPAC +5
1846   REF   3 LAST1023       00,3107  0 3131 1          TC      UNITDV
1847   REF   3 LAST1019       00,3110  1 7477 0          TCF     VROTATEX    AND EXIT.
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P1848 IF THE LENGTH OF THE ARGUMENT VECTOR WAS LESS THAN 2(-28), EACH COMPONENT MUST BE SHIFTED LEFT AT LEAST
R1850 14 PLACES BEFORE THE DIVIDE. NOTE THAT IN THIS CASE, THE MAJOR PART OF EACH COMPONENT IS ZERO.

1852	REF 51	LAST1023	00,3111	54 125 0	SMALL	IS	MPTEMP	NEGATIVE OF PRE-DIVIDE SHIFT COUNT.
1853	REF 284	LAST1022	00,3112	3 7767 0		CAF	ZERO	SHIFT EACH COMPONENT LEFT 14.
1854	REF 49	LAST1023	00,3113	56 113 1		XCH	VBUF +1	
1855	REF 50	LAST1024	00,3114	56 112 0		XCH	VBUF	
1856	REF 51	LAST1024	00,3115	56 115 1		XCH	VBUF +3	
1857	REF 52	LAST1024	00,3116	56 114 0		XCH	VBUF +2	
1858	REF 53	LAST1024	00,3117	56 117 0		XCH	VBUF +5	
1859	REF 54	LAST1024	00,3120	56 116 1		XCH	VBUF +4	
1860	REF 52	LAST1024	00,3121	4 0125 0		CS	MPTEMP	
1861	REF 341	LAST1023	00,3122	50 000 1		INDEX	A	
1862	REF 55	LAST1023	00,3123	3 7746 0		CAF	BIT14	
1863			00,3124	0 0006 1		EXTEND		
1864	REF 647	LAST1023	00,3125	7 0144 1		MP	MPAC	
1865	REF 1		00,3126	1 3040 1		TCF	SMALL2	
1866			00,3127	00015 0	THIRTEEN	DEC	13	
1867			00,3130	00016 0	FOURTEEN	DEC	14	

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P1868 THE FOLLOWING ROUTINE SETS UP THE CALL TO THE DIVIDE ROUTINES.

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1869  REF 648 LAST1024   00,3131  10 144 1  UNITDV  CCS   MPAC      FORCE MPAC POSITIVE IF POSSIBLE, SETTING
1870  REF   1            00,3132  1 3150 1          ICF   UMPAC+    DVSIGN ACCORDING TO THE SIGN OF MPAC
1871                     00,3133  1 3135 1          ICF   +2        SINCE THE DIVISOR IS ALWAYS POSITIVE
1872  REF   1            00,3134  1 3142 1          ICF   UMPAC-    HERE.

1873  REF 649 LAST1025   00,3135  10 145 0          CCS   MPAC +1
1874  REF   2 LAST1025   00,3136  1 3150 1          ICF   UMPAC+    EXIT IMMEDIATELY ON ZERO.
1875  REF 298 LAST1020   00,3137  0 0002 0          TC    Q
1876  REF   2 LAST1025   00,3140  1 3142 1          TCF   UMPAC-
1877  REF 299 LAST1025   00,3141  0 0002 0          TC    Q

1878  REF 285 LAST1024   00,3142  4 7767 1  UMPAC-  CS    ZERO      IF NEGATIVE, SET -0 IN DVSIGN FOR FINAL
1879  REF   9 LAST1020   00,3143  54 126 0          TS    DVSIGN    COMPLEMENT.
1880                     00,3144  0 0006 1          EXTEND
1881  REF 650 LAST1025   00,3145  4 0145 0          DCS   MPAC      PICK UP ABSOLUTE VALUE OF ARG AND JUMP.
1882  REF  53 LAST1024   00,3146  50 125 1          INDEX MPTEMP
1883  REF   3 LAST1020   00,3147  1 2540 0          ICF   MAXTEST -1

1884  REF  10 LAST1025   00,3150  54 126 0  UMPAC+  TS    DVSIGN    SET DVSIGN FOR POSITIVE QUOTIENT.
1885  REF 651 LAST1025   00,3151  52 145 0          DXCH  MPAC
1886  REF  54 LAST1025   00,3152  50 125 1          INDEX MPTEMP
1887  REF   4 LAST1025   00,3153  1 2540 0          ICF   MAXTEST -1
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P1888 MISCELLANEOUS UNARY OPERATIONS.

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1889  REF   1          00,3154  0 3262 1  DSQ       TC      DSQSUB      SQUARE THE DP CONTENTS OF MPAC.
1890  REF  39 LAST1012 00,3155  1 6125 0            TCF     DANZIG
1891  REF  30 LAST1008 00,3156 10 153  1  ABVALABS  CCS     MODE        ABVAL OR ABS INSTRUCTION.
1892  REF   3 LAST 902 00,3157  1 3206 1            TCF     ABS         DO ABS ON SCALAR.
1893  REF   4 LAST1026 00,3160  1 3206 1            TCF     ABS
1894  REF   2 LAST1022 00,3161  0 3301 0  ABVAL     TC      VSQSUB      DOT MPAC WITH ITSELF.
1895  REF  31 LAST1026 00,3162 22 153  0            EXCH    MODE        MODE IS NOW DP (L ZERO AFTER DAS).
1896                   00,3163  0 0006 1            EXTEND              STORE SQUARE OF LENGTH IN WORK AREA.
1897  REF 652 LAST1025 00,3164  3 0145 1            DCA     MPAC
1898  REF  44 LAST1023 00,3165 50 110  1            INDEX   FIXLOC
1899  REF   2 LAST1022 00,3166 52 043  1            DXCH    LVSQUARE
1900  REF   2 LAST1022 00,3167  0 3325 0  SQRT      TC      SQRTSUB     TAKE THE SQUARE ROOT OF MPAC.
1901  REF  55 LAST1025 00,3170 10 125  0            CCS     MPTEMP      RETURNED NORMALIZED SQUARE ROOT. SEE IF
1902                   00,3171  1 3173 0            TCF     +2          ANY UN-NORMALIZATION REQUIRED AND EXIT
1903  REF  40 LAST1026 00,3172  1 6125 0            TCF     DANZIG      IF NOT.
1904  REF   3 LAST1007 00,3173  6 3710 1            AD      NEG12       A RIGHT SHIFT OF MORE THAN 13 COULD BE
1905                   00,3174  0 0006 1            EXTEND              REQUIRED IF INPUT WAS ZERO IN MPAC,+1.
1906  REF   1          00,3175  6 3201 1            BZMF    SQRTSHFT    GOES HERE IN MOST CASES.
1907                   00,3176 22 007  0            ZL                  IF A LONG SHIFT IS REQUIRED, GO TO
1908  REF  77 LAST1008 00,3177 22 106  0            EXCH    ADDRWD      GENERAL RIGHT SHIFT ROUTINES.
1909  REF   4 LAST1007 00,3200  1 2303 1            TCF     GENSCR +4   ADDRWD WAS ZERO TO PREVENT ROUND.
1910  REF  56 LAST1026 00,3201 50 125  1  SQRTSHFT  INDEX   MPTEMP      SELECT SHIFTING BIT AND EXIT THROUGH
1911  REF  40 LAST 998 00,3202  3 7745 0            CAF     BIT15       SHIFT ROUTINES.
1912  REF  57 LAST1026 00,3203 54 125  0            TS      MPTEMP
1913  REF 286 LAST1025 00,3204  3 7767 0            CAF     ZERO        TO ZERO MPAC +2 IN THE PROCESS.
1914  REF   2 LAST1007 00,3205  1 2036 1            TCF     MPACSHR +3
1915  REF   3 LAST1004 00,3206  0 7001 1  ABS       TC      BRANCH      TEST SIGN OF MPAC AND COMPLEMENT IF
1916  REF  41 LAST1026 00,3207  1 6125 0            TCF     DANZIG
1917  REF  42 LAST1026 00,3210  1 6125 0            TCF     DANZIG
1918  REF   4 LAST 996 00,3211  1 7722 0            TCF     COMP
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1919  REF  30 LAST 991   00,3212  4 7761 1  VDEF   CS    FOUR          VECTOR DEFINE - ESSENTIALLY TREATS
1920  REF  14 LAST 994   00,3213  26 156 1         ADS   PUSHLOC       SCALAR IN MPAC AS X COMPONENT, PUSHES UP
1921                     00,3214  0 0006 1         EXTEND              FOR Y AND THEN AGAIN FOR Z.
1922  REF 342 LAST1024   00,3215  5 0000 1         INDEX A
1923                     00,3216  3 0003 1         DCA   2
1924  REF 653 LAST1026   00,3217  52 150 1         DXCH  MPAC +3
1925                     00,3220  0 0006 1         EXTEND
1926  REF  15 LAST1027   00,3221  5 0156 0         INDEX PUSHLOC
1927                     00,3222  3 0001 0         DCA   0
1928  REF 654 LAST1027   00,3223  52 152 0         DXCH  MPAC +5
1929  REF 172 LAST1023   00,3224  4 7763 0         CS    ONE           MODE IS NOW VECTOR.
1930  REF  10 LAST 999   00,3225  1 6124 1         TCF   NEWMODE

1931  REF   3 LAST1026   00,3226  0 3301 0  VSQ    TC    VSQSUB        DOT MPAC WITH ITSELF.
1932  REF 287 LAST1026   00,3227  3 7767 0         CAF   ZERO
1933  REF  11 LAST1027   00,3230  1 6124 1         TCF   NEWMODE       MODE IS NOW DP.

1934                     00,3231  0 0006 1  PUSH   EXTEND              PUSH DOWN MPAC LEAVING IT LOADED.
1935  REF 655 LAST1027   00,3232  3 0145 1         DCA   MPAC
1936  REF  16 LAST1027   00,3233  50 156 0         INDEX PUSHLOC       PUSH DOWN FIRST TWO REGISTERS IN EACH
1937                     00,3234  52 001 1         DXCH  0

1938  REF  32 LAST1026   00,3235  50 153 0         INDEX MODE          INCREMENT PUSHDOWN POINTER.
1939  REF   5 LAST 972   00,3236  3 6310 0         CAF   NO.WDS
1940  REF  17 LAST1027   00,3237  26 156 1         ADS   PUSHLOC

1941  REF  33 LAST1027   00,3240  10 153 1         CCS   MODE
1942  REF   1            00,3241  1 3254 0         TCF   TPUSH         PUSH DOWN MPAC +2.
1943  REF  43 LAST1026   00,3242  1 6125 0         TCF   DANZIG        DONE FOR DP.

1944                     00,3243  0 0006 1         EXTEND              ON VECTOR, PUSH DOWN Y AND Z COMPONENTS.
1945  REF 656 LAST1027   00,3244  3 0150 0         DCA   MPAC +3
1946  REF  18 LAST1027   00,3245  50 156 0         INDEX PUSHLOC
1947                     00,3246  51'775 0         DXCH  0 -4
1948                     00,3247  0 0006 1         EXTEND
1949  REF 657 LAST1027   00,3250  3 0152 1         DCA   MPAC +5
1950  REF  19 LAST1027   00,3251  50 156 0         INDEX PUSHLOC
1951                     00,3252  51'777 1         DXCH  0 -2
1952  REF  44 LAST1027   00,3253  1 6125 0         TCF   DANZIG

1953  REF 658 LAST1027   00,3254  3 0146 1  TPUSH  CA    MPAC +2
1954  REF   2 LAST 971   00,3255  1 6632 1         TCF   ENDTPUSH +2

1955  REF  45 LAST1026   00,3256  50 110 1  RVQ    INDEX FIXLOC        RVQ = RETURN IVA QPRET.
1956  REF   4 LAST 974   00,3257  3 0052 0         CA    QPRET
19565 REF  22 LAST 985   00,3260  54 107 0         TS    POLISH
1957  REF   5 LAST 975   00,3261  1 6730 1         TCF   GOTO +4       (ASSUME QPRET POINTS TO FIXED ONLY.)
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P1958           THE FOLLOWING SUBROUTINES ARE USED IN SQUARING MPAC, IN BOTH THE SCALAR AND VECTOR SENSE. THEY ARE
R1960   SPECIAL CASES OF DMPSUB AND DOTSUB, PUT IN TO SAVE SOME TIME.

 1961   REF 659 LAST1027    00,3262  3 0145 1  DSQSUB   CA      MPAC +1         SQUARES THE SCALAR CONTENTS OF MPAC.
 1962                       00,3263  0 0006 1           EXTEND
 1963                       00,3264  7 0000 0           SQUARE
 1964   REF 660 LAST1028    00,3265  54 146 0           TS      MPAC +2
 1965   REF 288 LAST1027    00,3266  3 7767 0           CAF     ZERO            FORM 2(CROSS TERM).
 1966   REF 661 LAST1028    00,3267  56 145 1           XCH     MPAC +1
 1967                       00,3270  0 0006 1           EXTEND
 1968   REF 662 LAST1028    00,3271  7 0144 1           MP      MPAC
 1969                       00,3272  20 001 1           DDOUBL                  AND MAYBE OVERFLOW.
 1970   REF 663 LAST1028    00,3273  20 146 0           DAS     MPAC +1         AND SET A TO NET OVERFLOW.
 1971   REF 664 LAST1028    00,3274  56 144 0           XCH     MPAC
 1972                       00,3275  0 0006 1           EXTEND
 1973                       00,3276  7 0000 0           SQUARE
 1974   REF 665 LAST1028    00,3277  20 145 0           DAS     MPAC
 1975   REF 300 LAST1025    00,3300  0 0002 0           TC      Q

 1976                       00,3301  0 0006 1  VSQSUB   EXTEND                  DOTS THE VECTOR IN MPAC WITH ITSELF.
 1977   REF   8 LAST 983    00,3302  22 127 0           DXCH    DOTRET
 1978   REF   2 LAST1026    00,3303  0 3262 1           TC      DSQSUB          SQUARE THE X COMPONENT.
 1979   REF 666 LAST1028    00,3304  52 150 1           DXCH    MPAC +3
 1980   REF 667 LAST1028    00,3305  52 145 0           DXCH    MPAC
 1981   REF 118 LAST1023    00,3306  52 121 1           DXCH    BUF             SO WE CAN END IN DOTSUB.
 1982   REF 668 LAST1028    00,3307  3 0146 1           CA      MPAC +2
 1983   REF 119 LAST1028    00,3310  54 122 1           TS      BUF +2

 1984   REF   3 LAST1028    00,3311  0 3262 1           TC      DSQSUB          SQUARE Y COMPONENT.
 1985   REF 669 LAST1028    00,3312  52 146 0           DXCH    MPAC +1
 1986   REF 120 LAST1028    00,3313  20 122 1           DAS     BUF +1
 1987   REF 670 LAST1028    00,3314  6 0144 0           AD      MPAC
 1988   REF 121 LAST1028    00,3315  6 0120 1           AD      BUF
 1989   REF 122 LAST1028    00,3316  54 120 0           TS      BUF
 1990                       00,3317  1 3321 0           TCF     +2
 1991   REF  21 LAST1022    00,3320  54 111 1           TS      OVFIND          IF OVERFLOW.

 1992   REF 671 LAST1028    00,3321  52 152 0           DXCH    MPAC +5
 1993   REF 672 LAST1028    00,3322  52 145 0           DXCH    MPAC
 1994   REF   4 LAST1028    00,3323  0 3262 1           TC      DSQSUB          SQUARE Z COMPONENT.
 1995   REF   1             00,3324  1 7257 1           TCF     ENDDOT          END AS IN DOTSUB.
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P1996 DOUBLE PRECISION SQUARE ROOT ROUTINE. TAKE THE SQUARE ROOT OF THE TRIPLE PRECISION (MPAC +2 USED ONLY
R1998 IN NORMALIZATION) CONTENTS OF MPAC AND LEAVE THE NORMALIZED RESULT IN MPAC (C(MPAC) GREATER THAN OR EQUAL TO
R2000 .5). THE RIGHT SHIFT COUNT (TO UNNORMALIZE) IS LEFT IN MPTEMP.

2001	REF 289	LAST1028	00,3325	3 7767 0	SQRTSUB	CAF	ZERO	START BY ZEROING RIGHT SHIFT COUNT.
2002	REF 58	LAST1026	00,3326	54 125 0		TS	MPTEMP	
2003	REF 673	LAST1028	00,3327	10 144 1		CCS	MPAC	CHECK FOR POSITIVE ARGUMENT, SHIFTING
2004	REF 1		00,3330	1 3366 0		TCF	SMPAC+	FIRST SIGNIFICANT MPAC REGISTER INTO
2005			00,3331	1 3333 0		TCF	+2	MPAC ITSELF.
2006	REF 1		00,3332	1 3355 0		TCF	SQRTNEG	SEE IF MAG OF ARGUMENT LESS THAN 10(-4).
2007	REF 674	LAST1029	00,3333	56 146 1		XCH	MPAC +2	MPAC IS ZERO - SHIFT LEFT 14.
2008	REF 675	LAST1029	00,3334	56 145 1		XCH	MPAC +1	
2009	REF 676	LAST1029	00,3335	54 144 1		TS	MPAC	
2010	REF 18	LAST 998	00,3336	3 7765 1		CAF	SEVEN	AUGMENT RIGHT SHIFT COUNTER.
2011	REF 59	LAST1029	00,3337	54 125 0		TS	MPTEMP	
2012	REF 677	LAST1029	00,3340	10 144 1		CCS	MPAC	SEE IF MPAC NOW PNZ.
2013	REF 2	LAST1029	00,3341	1 3366 0		TCF	SMPAC+	
2014			00,3342	1 3344 0		TCF	+2	
2015	REF 1		00,3343	1 3360 0		TCF	ZEROANS	NEGATIVE BUT LESS THAN 10(-4) IN MAG.
2016	REF 678	LAST1029	00,3344	56 145 1		XCH	MPAC +1	ZERO - SHIFT LEFT 14 AGAIN.
2017	REF 679	LAST1029	00,3345	54 144 1		TS	MPAC	
2018	REF 19	LAST1029	00,3346	3 7765 1		CAF	SEVEN	AUGMENT RIGHT SHIFT COUNTER.
2019	REF 60	LAST1029	00,3347	26 125 0		ADS	MPTEMP	
2020	REF 680	LAST1029	00,3350	10 144 1		CCS	MPAC	
2021	REF 3	LAST1029	00,3351	1 3366 0		TCF	SMPAC+	
2022	REF 301	LAST1028	00,3352	0 0002 0		TC	Q	SQRT(0) = 0.
2023	REF 2	LAST1029	00,3353	1 3360 0		TCF	ZEROANS	
2024	REF 1		00,3354	1 3434 0		TCF	FIXROOT	DO NOT LEAVE SQRTSUB WITH -0 IN MPAC.
2025	REF 343	LAST1027	00,3355	10 000 0	SQRTNEG	CCS	A	ARGUMENT IS NEGATIVE, BUT SEE IF SIGN-
2026	REF 1		00,3356	1 3364 1		TCF	SQRTABRT	CORRECTED ARGUMENT IS LESS THAN 10(-4)
2027	REF 681	LAST1029	00,3357	10 145 0		CCS	MPAC +1	IN MAGNITUDE. IF SO, CALL ANSWER ZERO.
2028	REF 290	LAST1029	00,3360	3 7767 0	ZEROANS	CAF	ZERO	FORCE ANSWER TO ZERO HERE.
2029	REF 2	LAST1029	00,3361	1 3434 0		TCF	FIXROOT	
2030	REF 2	LAST1029	00,3362	1 3364 1		TCF	SQRTABRT	
2031	REF 3	LAST1029	00,3363	1 3434 0		TCF	FIXROOT	
2032	REF 6	LAST 708	00,3364	0 6000 1	SQRTABRT	TC	ABORT	
2033			00,3365	01302 1		OCT	1302	

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2034	REF 1		00,3366	6 2442 1	SMPAC+	AD	-1/2+2		SEE IF ARGUMENT GREATER THAN OR EQUAL TO
2035			00,3367	0 0006 1		EXTEND			.5.
2036	REF 1		00,3370	6 3437 1		BZMF	SRTEST		IF SO, SEE IF LESS THAN .25.
2037	REF 682	LAST1029	00,3371	52 145 0		DXCH	MPAC		WE WILL TAKE THE SQUARE ROOT OF MPAC/2.
2038	REF 30	LAST1013	00,3372	22 021 1		DXCH	SR		SHIFT RIGHT 1 AND GO TO THE SQRT ROUTINE
2039			00,3373	0 0006 1		EXTEND			
2040	REF 23	LAST1021	00,3374	7 7746 1		MP	HALF		
2041	REF 683	LAST1030	00,3375	52 145 0		DXCH	MPAC		
2042	REF 31	LAST1030	00,3376	56 021 1		XCH	SR		
2043	REF 684	LAST1030	00,3377	26 145 0		ADS	MPAC +1		GUARANTEED NO OVERFLOW.
2044	REF 1		00,3400	3 2314 0	ARGHI	CAF	SLOPEHI		ARGUMENT BETWEEN .25 AND .5. GET A
2045			00,3401	0 0006 1		EXTEND			LINEAR APPROXIMATION FOR THIS RANGE.
2046	REF 685	LAST1030	00,3402	7 0144 1		MP	MPAC		
2047	REF 1		00,3403	6 2542 0		AD	BIASHI		X0/2 = (MPAC/2)(SLOPEHI) + BIASHI/2.
2048	REF 123	LAST1028	00,3404	54 120 0	*4	TS	BUF		X0/2 (ARGLO ENTERS HERE).
2049	REF 686	LAST1030	00,3405	3 0144 0		CA	MPAC		SINGLE-PRECISION THROUGHOUT.
2050			00,3406	22 007 0		ZL			
2051			00,3407	0 0006 1		EXTEND			
2052	REF 124	LAST1030	00,3410	10 120 0		DV	BUF		(MPAC/2)/(X0/2)
2053			00,3411	0 0006 1		EXTEND			
2054	REF 24	LAST1030	00,3412	7 7746 1		MP	HALF		
2055	REF 125	LAST1030	00,3413	26 120 0		ADS	BUF		X1 = X0/2 + .5(MPAC/2)/(X0/2).
2056			00,3414	0 0006 1		EXTEND			
2057	REF 25	LAST1030	00,3415	7 7746 1		MP	HALF		FORM UP X1/2.
2058	REF 687	LAST1030	00,3416	52 145 0		DXCH	MPAC		SAVE AND BRING OUT ARGUMENT.
2059			00,3417	0 0006 1		EXTEND			TAKE DP QUOTIENT WITH X1.
2060	REF 126	LAST1030	00,3420	10 120 0		DV	BUF		
2061	REF 127	LAST1030	00,3421	54 121 1		TS	BUF +1		SAVE MAJOR PART OF QUOTIENT.
2062	REF 291	LAST1029	00,3422	3 7767 0		CAF	ZERO		FORM MINOR PART OF QUOTIENT USING
2063	REF 181	LAST1023	00,3423	56 001 0		XCH	L		(REMAINDER,0).
2064			00,3424	0 0006 1		EXTEND			
2065	REF 128	LAST1030	00,3425	10 120 0		DV	BUF		
2066	REF 182	LAST1030	00,3426	54 001 1		TS	L		IN PREPARATION FOR DAS.
2067	REF 129	LAST1030	00,3427	3 0121 0		CA	BUF +1		
2068	REF 688	LAST1030	00,3430	20 145 0		DAS	MPAC		X2 = X1/2 + (MPAC/2)X1
2069			00,3431	0 0006 1		EXTEND			OVERFLOWS IF ARG. NEAR POSMAX.
2070	REF 1		00,3432	1 3436 1		BZF	TCQBNK00		
2071	REF 60	LAST1021	00,3433	3 7743 0		CAF	POSMAX		
2072	REF 689	LAST1030	00,3434	54 144 1	FIXROOT	TS	MPAC		
2073	REF 690	LAST1030	00,3435	54 145 0		TS	MPAC +1		
2074	REF 302	LAST1029	00,3436	0 0002 0	TCQBNK00	TC	Q		RETURN TO CALLER TO UNNORMALIZE, ETC.

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2075	REF 2 LAST 504	00,3437	6 7747 1	SRTEST	AD	QUARTER		ARGUMENT WAS LESS THAN .5, SEE IF LESS
2076		00,3440	0 0006 1		EXTEND			THAN .25.
2077	REF 1	00,3441	6 3463 0		BZMF	SQRTNORM		IF SO, BEGIN NORMALIZATION.
2078	REF 691 LAST1030	00,3442	52 145 0		DXCH	MPAC		IF BETWEEN .5 AND .25, SHIFT RIGHT 1 AND
2079	REF 32 LAST1030	00,3443	22 021 1		LXCH	SR		START AT ARGLO.
2080		00,3444	0 0006 1		EXTEND			
2081	REF 26 LAST1030	00,3445	7 7746 1		MP	HALF		
2082	REF 692 LAST1031	00,3446	52 145 0		DXCH	MPAC		
2083	REF 33 LAST1031	00,3447	56 021 1		XCH	SR		
2084	REF 693 LAST1031	00,3450	26 145 0		ADS	MPAC +1		NO OVERFLOW.
2085	REF 1	00,3451	3 2772 1	ARGLO	CAF	SLOPELO		(NORMALIZED) ARGUMENT BETWEEN .125 AND
2086		00,3452	0 0006 1		EXTEND			.25
2087	REF 694 LAST1031	00,3453	7 0144 1		MP	MPAC		
2088	REF 1	00,3454	6 2270 0		AD	BIASLO		
2089	REF 1	00,3455	1 3404 0		TCF	ARGHI +4		BEGIN SQUARE ROOT.
2090		00,3456	0 0006 1	SQRTNM2	EXTEND			SHIFT LEFT 2 AND INCREMENT RIGHT SHIFT
2091	REF 695 LAST1031	00,3457	3 0146 1		DCA	MPAC +1		COUNT (FOR TERMINAL UNNORMALIZATION).
2092	REF 696 LAST1031	00,3460	20 146 0		DAS	MPAC +1		
2093	REF 697 LAST1031	00,3461	6 0144 0		AD	MPAC		
2094	REF 698 LAST1031	00,3462	26 144 1		ADS	MPAC		(NO OVERFLOW).
2095	REF 61 LAST1029	00,3463	24 125 1	SQRTNORM	INCR	MPTEMP		FIRST TIME THROUGH, JUST SHIFT LEFT 1
2096		00,3464	0 0006 1		EXTEND			(PUTS IN EFFECTIVE RIGHT SHIFT SINCE
2097	REF 699 LAST1031	00,3465	3 0146 1		DCA	MPAC +1		WE WANT MPAC/2).
2098	REF 700 LAST1031	00,3466	20 146 0		DAS	MPAC +1		
2099	REF 701 LAST1031	00,3467	6 0144 0		AD	MPAC		
2100	REF 702 LAST1031	00,3470	26 144 1		ADS	MPAC		(AGAIN NO OVERFLOW).
2101		00,3471	6 0000 1		DOUBLE			
2102	REF 18 LAST 303	00,3472	54 022 0		TS	CYL		
2103	REF 19 LAST1031	00,3473	10 022 0	NORMTEST	CCS	CYL		SEE IF ARGUMENT NOW NORMALIZED AT
2104	REF 20 LAST1031	00,3474	10 022 0		CCS	CYL		GREATER THAN .125.
2105	REF 1	00,3475	1 3456 1		TCF	SQRTNM2		NO - SHIFT LEFT 2 MORE AND TRY AGAIN.
2106	REF 2 LAST1031	00,3476	1 3400 1		TCF	ARGHI		YES - NOW BETWEEN .5 AND .25.
2107	REF 1	00,3477	1 3451 0		TCF	ARGLO		ARGUMENT NOW BETWEEN .25 AND .125.

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P2108 TRIGONOMETRIC FUNCTION PACKAGE.

R2109 THE FOLLOWING TRIGONOMETRIC FUNCTIONS ARE AVAILABLE AS INTERPRETIVE OPERATIONS:

R2111 1. SIN COMPUTES (1/2)SINE(2 PI MPAC).
R2112 2. COS COMPUTES (1/2)COSINE(2 PI MPAC).

R2113 3. ASIN COMPUTES (1/2PI)ARCSINE(2 MPAC).
R2114 4. ACOS COMPUTES (1/2PI)ARCCOSINE(2 MPAC).

R2115 SIN-ASIN AND COS-ACOS ARE MUTUALLY INVERSE. IE SIN(ASIN(X)) = X.

```
 2116  REF   4 LAST1026    00,3500  0 7001 1  COSINE   TC      BRANCH          FINDS COSINE USING THE IDENTITY
 2117                      00,3501  1 3504 1           TCF     +3              COS(X) = SIN(PI/2 - ABS(X)).
 2118  REF   1             00,3502  1 3507 1           TCF     PRESINE
 2119  REF   2 LAST1032    00,3503  1 3507 1           TCF     PRESINE

 2120                      00,3504  0 0006 1  +3       EXTEND
 2121  REF 703 LAST1031    00,3505  4 0145 0           DCS     MPAC
 2122  REF 704 LAST1032    00,3506  52 145 0           DXCH    MPAC

 2123  REF   3 LAST1031    00,3507  3 7747 1  PRESINE  CAF     QUARTER         PI/2 SCALED.
 2124  REF 705 LAST1032    00,3510  26 144 1           ADS     MPAC


 2125  REF 706 LAST1032    00,3511  52 145 0  SINE     DXCH    MPAC            DOUBLE ARGUMENT.
 2126                      00,3512  20 001 1           DDOUBL
 2127                      00,3513  54 000 0           OVSK                    SEE IF OVERFLOW PRESENT.
 2128                      00,3514  1 3517 0           TCF     +3              IF NOT, ARGUMENT OK AS IS.

 2129                      00,3515  0 0006 1           EXTEND                  IF SO, WE LOST (OR GAINED) PI, SO
 2130                      00,3516  4 0001 1           DCOM                    COMPLEMENT MPAC USING THE IDENTITY
A2131                                                                        SIN(X-(+)PI) = SIN(-X).
 2132  REF 707 LAST1032    00,3517  52 145 0  +3       DXCH    MPAC
 2133  REF 708 LAST1032    00,3520  3 0144 0           CA      MPAC            SEE IF ARGUMENT GREATER THAN .5 IN
 2134                      00,3521  6 0000 1           DOUBLE                  MAGNITUDE. IF SO, REDUCE IT TO LESS THAN
 2135  REF 183 LAST1030    00,3522  54 001 1           IS      L               .5 (+-PI/2 SCALED) AS FOLLOWS:
 2136  REF   1             00,3523  1 3534 1           TCF     SN1

 2137  REF 344 LAST1029    00,3524  50 000 1           INDEX   A               IF POSITIVE, FORM PI - X, IF NEGATIVE
 2138  REF   9 LAST 685    00,3525  3 7745 0           CAF     NEGI/2 +1       USE -PI - X.
 2139                      00,3526  6 0000 1           DOUBLE
 2140                      00,3527  0 0006 1           EXTEND
 2141  REF 709 LAST1032    00,3530  60 144 0           SU      MPAC            GUARANTEED NO OVERFLOW.
 2142  REF 710 LAST1032    00,3531  54 144 1           IS      MPAC
 2143  REF 711 LAST1032    00,3532  4 0145 0           CS      MPAC +1
 2144  REF 712 LAST1032    00,3533  54 145 0           IS      MPAC +1
```

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```
2145                          00,3534  0 0006 1  SN1    EXTEND                SET UP TO EVALUATE HASTINGS POLYNOMIAL
2146   REF 713 LAST1032       00,3535  3 0145 1         DCA     MPAC
2147   REF  21 LAST1021       00,3536  52 124 1         DXCH    BUF2
2148   REF   5 LAST1028       00,3537  0 3262 1         TC      DSQSUB               SQUARE MPAC.

2149   REF   5 LAST 937        00,3540  0 7274 1         TC      POLY                 EVALUATE FOURTH ORDER POLYNOMIAL.
2150                          00,3541   00003 1         DEC     3
2151                          00,3542   14441 0         2DEC    +.3926990796
C2151                         00,3543   37325 1
2152                          00,3544   53250 0         2DEC    -.6459637111
C2152                         00,3545   60764 1
2153                          00,3546   12146 1         2DEC    +.318758717
C2153                         00,3547   21276 1
2154                          00,3550   75466 1         2DEC    -.074780249
C2154                         00,3551   71471 0
2155                          00,3552   00236 0         2DEC    +.009694988
C2155                         00,3553   32757 0
2156   REF   1                00,3554  3 2466 1         CAF     LBUF2                MULTIPLY BY ARGUMENT AND SHIFT LEFT 2.
2157   REF  19 LAST 994        00,3555  0 7160 1         TC      DMPSUB -1

2158                          00,3556  0 0006 1         EXTEND
2159   REF 714 LAST1033       00,3557  3 0146 1         DCA     MPAC +1
2160   REF 715 LAST1033       00,3560  20 146 0         DAS     MPAC +1
2161   REF 716 LAST1033       00,3561  6 0144 0         AD      MPAC
2162   REF 717 LAST1033       00,3562  26 144 1         ADS     MPAC                 NEITHER SHIFT OVERFLOWS.
2163                          00,3563  0 0006 1         EXTEND
2164   REF 718 LAST1033       00,3564  3 0146 1         DCA     MPAC +1
2165   REF 719 LAST1033       00,3565  20 146 0         DAS     MPAC +1
2166   REF 720 LAST1033       00,3566  6 0144 0         AD      MPAC
2167   REF 721 LAST1033       00,3567  26 144 1         ADS     MPAC
2168   REF  45 LAST1027       00,3570  1 6125 0         TCF     DANZIG
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P2169 ARCSIN/ARCCOS ROUTINE.

```
2170  REF   1                 00,3571  3 3612 1  ARCSIN   CAF    LASINEX     COMPUTE ARCSIN BY USING THE IDENTITY
2171                          00,3572  1 3574 0           TCF    +2          ARCSIN(X) = PI/2 - ARCCOS(X).

2172  REF   1                 00,3573  3 3674 1  ARCCOS   CAF    LDANZIG     (EXITS IMMEDIATELY).
2173  REF   1                 00,3574  54 126 0           IS     ESCAPE
2174  REF   5 LAST1032        00,3575  0 7001 1           TC     BRANCH      TEST SIGN OF INPUT.
2175  REF   1                 00,3576  1 3606 0           TCF    ACOSST      START IMMEDIATELY IF POSITIVE.
2176  REF   1                 00,3577  1 3706 1           TCF    ACOSZERO    ARCCOS(0) = PI/2 = .25.
2177                          00,3600  0 0006 1           EXTEND              IF NEGATIVE, USE THE IDENTITY
2178  REF 722 LAST1033        00,3601  4 0145 0           DCS    MPAC        ARCCOS(X) = PI - ARCCOS(-X), FORCING
2179  REF 723 LAST1034        00,3602  52 145 0           DXCH   MPAC        ARGUMENT POSITIVE.
2180  REF   1                 00,3603  3 3711 0           CAF    TCSUBTR     SET EXIT  TO DO ABOVE BEFORE
2181  REF   2 LAST1034        00,3604  56 126 1           XCH    ESCAPE      ARCSIN/ARCCOS CONSIDERATIONS.
2182  REF   1                 00,3605  54 127 1           IS     ESCAPE2

2183  REF  27 LAST1031        00,3606  4 7746 1  ACOSSI   CS     HALF        TEST MAGNITUDE OF INPUT.
2184  REF 724 LAST1034        00,3607  6 0144 0           AD     MPAC
2185  REF 345 LAST1032        00,3610  10 000 0           CCS    A
2186  REF   1                 00,3611  1 3702 0           TCF    ACOSOVF     THIS IS PROBABLY AN OVERFLOW CASE.

2187  REF   1                 00,3612  1 3670 1  LASINEX  TCF    ASINEX

2188  REF   1                 00,3613  1 3623 1           TCF    ACOSST2     NO OVERFLOW - PROCEED.

2189  REF 725 LAST1034        00,3614  10 145 0           CCS    MPAC +1     IF MAJOR PART IS .5, CALL ANSWER 0
2190  REF 292 LAST1030        00,3615  3 7767 0           CAF    ZERO        UNLESS MINOR PART NEGATIVE.
2191  REF   1                 00,3616  1 3620 1           TCF    ACOS=0

2192  REF   2 LAST1034        00,3617  1 3623 1           TCF    ACOSST2

2193  REF 726 LAST1034        00,3620  54 145 0  ACOS=0   IS     MPAC +1
2194  REF 727 LAST1034        00,3621  54 144 1           IS     MPAC
2195  REF   3 LAST1034        00,3622  0 0126 1           TC     ESCAPE

2196                          00,3623  0 0006 1  ACOSST2  EXTEND              NOW THAT ARGUMENT IS IN PROPER RANGE,
2197  REF 728 LAST1034        00,3624  4 0145 0           DCS    MPAC        BEGIN COMPUTATION. USE HASTINGS
2198  REF  28 LAST1034        00,3625  6 7746 0           AD     HALF        APPROXIMATION ARCCOS(X) = SQRT(1-X)P(X)
2199  REF 729 LAST1034        00,3626  52 145 0           DXCH   MPAC        IN A SCALED VERSION WHERE P(X) IS A
2200  REF  22 LAST1033        00,3627  52 124 1           DXCH   BUF2        SEVENTH ORDER POLYNOMIAL.

2201  REF   3 LAST1026        00,3630  0 3325 0           TC     SQRTSUB     RETURNS WITH NORMALIZED SQUARE ROOT.

2202  REF  62 LAST1031        00,3631  10 125 0           CCS    MPTEMP      SEE IF UN-NORMALIZATION REQUIRED.
2203  REF   1                 00,3632  1 3675 1           TCF    ACOSSHR     IF SO.
```

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```
 2204   REF 730 LAST1034    00,3633  52 145 0  ACOS3   DXCH   MPAC          SET UP FOR POLYNOMIAL EVALUATION.
 2205   REF  23 LAST1034    00,3634  52 124 1          DXCH   BUF2
 2206   REF 731 LAST1035    00,3635  52 145 0          DXCH   MPAC

 2207   REF   6 LAST1033    00,3636  0 7274 1          TC     POLY
 2208                       00,3637   00006 1          DEC    6
 2209                       00,3640   13240 0          2DEC   +.353553385     COEFFICIENTS ARE C 2(+1)/PISQRT(2) WHERE
C2209                       00,3641   23630 0
 2210                       00,3642   74721 0          2DEC*  -.0483017006 B+1*          I
C2210                       00,3643   47775 1
 2211                       00,3644   02440 0          2DEC*  +.0200273085 B+2*   WHERE C STANDS FOR ORIGINAL COEFFS.
C2211                       00,3645   20237 0
 2212                       00,3646   75067 1          2DEC*  -.0112931863 B+3*
C2212                       00,3647   70742 1
 2213                       00,3650   03436 0          2DEC*  +.00695311612 B+4*
C2213                       00,3651   26756 1
 2214                       00,3652   74037 0          2DEC*  -.00384617957 B+5*
C2214                       00,3653   57640 1
 2215                       00,3654   03046 0          2DEC*  +.001501297736 B+6*
C2215                       00,3655   07143 0
 2216                       00,3656   76654 1          2DEC*  -.000284160334 B+7*
C2216                       00,3657   42244 0
 2217   REF   2 LAST1033    00,3660  3 2466 1          CAF    LBUF2          DO FINAL MULTIPLY AND GO TO ANY
 2218   REF  20 LAST1033    00,3661  0 7160 1          TC     DMPSUB -1      EPILOGUE SEQUENCES.
 2219   REF   4 LAST1034    00,3662  0 0126 1          TC     ESCAPE

 2220                       00,3663  0 0006 1  SUBTR   EXTEND
 2221   REF 732 LAST1035    00,3664  4 0145 0          DCS    MPAC           EPILOGUE FOR NEGATIVE INPUTS TO ARCCOS.
 2222   REF  29 LAST1034    00,3665  6 7746 0          AD     HALF           FORMS PI - ARCCOS(-X) = ARCCOS(X).
 2223   REF 733 LAST1035    00,3666  52 145 0          DXCH   MPAC
 2224   REF   2 LAST1034    00,3667  0 0127 0          TC     ESCAPE2        GO TO POSSIBLE ARCSIN EPILOGUE.

 2225                       00,3670  0 0006 1  ASINEX  EXTEND
 2226   REF 734 LAST1035    00,3671  4 0145 0          DCS    MPAC           ARCSIN EPILOGUE - GET ARCSIN(X)
 2227   REF   4 LAST1032    00,3672  6 7747 1          AD     QUARTER        = PI/2 - ARCCOS(X).
 2228   REF 735 LAST1035    00,3673  52 145 0          DXCH   MPAC
 2229   REF  46 LAST1033    00,3674  1 6125 0  LDANZIG TCF    DANZIG
```

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```
2230   REF 346 LAST1034   00,3675  50 000 1  ACOSSHR   INDEX   A          THE SHIFT RIGHT IS LESS THAN 14 SINCE
2231   REF  56 LAST1024   00,3676  3 7746 0             CAF     BIT14      THE INPUT WAS NON-ZERO DP.
2232   REF  63 LAST1034   00,3677  54 125 0             TS      MPTEMP
2233   REF   4 LAST1002   00,3700  0 2073 1             TC      VSHRRND    DP SHIFT RIGHT AND ROUND.
2234   REF   1            00,3701  1 3633 0             TCF     ACOS3      PROCEED.

2235                      00,3702  0 0006 1  ACOSOVF   EXTEND             IF MAJOR PART WAS ONLY 1 MORE THAN .5,
2236   REF   2 LAST1034   00,3703  1 3620 1             BZF     ACOS=0     CALL ANSWER ZERO.

2237   REF   7 LAST1029   00,3704  0 6000 1  ACOSABRT  TC      ABORT
2238                      00,3705   01301 1             OCT     1301

2239   REF   5 LAST1035   00,3706  3 7747 1  ACOSZERO  CAF     QUARTER    ACOS(0) = PI/2.
2240   REF   3 LAST1036   00,3707  1 3621 0             TCF     ACOS=0 +1  SET MPAC AND EXIT VIA ESCAPE.

22403                     00,3710   77763 0  NEG12     DEC     -12
22406  REF   1            00,3711  1 3663 0  TCSUBTR   TCF     SUBTR
```

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P22409 AUXILIARY CODING FOR DDV/BDDV;

```
2241   REF 347 LAST1036   00,3712  10 000 0  BUFPOS   CCS   A
22411  REF   2 LAST1009   00,3713  1 2420 1           TCF   BUF+          TO BUF+ IF BUF IS GREATER THAN +1.

22412  REF 130 LAST1030   00,3714  4 0121 1           CS    BUF +1        IF BUF IS +1, FORCING SIGN AGREEMENT
22413                      00,3715  0 0006 1           EXTEND              MAY CAUSE BUF TO BECOME ZERO.
22414  REF   3 LAST1037   00,3716  6 2420 0           BZMF  BUF+          BRANCH IF SIGNS AGREE.

22415  REF  30 LAST1035   00,3717  3 7746 0           CA    HALF          SIGNS DISAGREE.  FORCE AGREEMENT.
22416                      00,3720  6 0000 1   +6      DOUBLE
22417  REF 131 LAST1037   00,3721  26 121 1           ADS   BUF +1
22418  REF 293 LAST1034   00,3722  3 7767 0           CA    ZERO
22419  REF 132 LAST1037   00,3723  54 120 0           TS    BUF
2242   REF   1            00,3724  1 2362 0           TCF   BUFZERO


22421  REF 348 LAST1037   00,3725  10 000 0  BUFNEG   CCS   A
22422  REF   2 LAST1009   00,3726  1 2414 0           TCF   BUF-          TO BUF- IF BUF IS LESS THAN -1.

22423  REF 133 LAST1037   00,3727  3 0121 0           CA    BUF +1        IF BUF IS -1, FORCING SIGN AGREEMENT
22424                      00,3730  0 0006 1           EXTEND              MAY CAUSE BUF TO BECOME ZERO.
22425  REF   3 LAST1037   00,3731  6 2414 1           BZMF  BUF-          BRANCH IF SIGNS AGREE.

22426  REF  31 LAST1037   00,3732  4 7746 1           CS    HALF          SIGNS DISAGREE.  FORCE AGREEMENT.
22427  REF   2 LAST1009   00,3733  1 3720 0           TCF   BUFPOS +6
```

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P22428 THE FOLLOWING INSTRUCTIONS ARE AVAILABLE FOR SETTING, MODIFYING, AND BRANCHING ON INDEX REGISTERS:

R2243 1. AXT ADDRESS TO INDEX TRUE.
R2244 1. AXC ADDRESS TO INDEX COMPLEMENTED.
R2245 3. LXA LOAD INDEX FROM ERASABLE.
R2246 4. LXC LOAD INDEX COMPLEMENTED FROM ERASABLE.
R2247 5. SXA STORE INDEX IN ERASABLE.
R2248 6. XCHX EXCHANGE INDEX REGISTER WITH ERASABLE.

R2249 7. INCR INCREMENT INDEX REGISTER.
R2250 8. XAD ERASABLE ADD TO INDEX REGISTER.
R2251 9. XSU ERASABLE SUBTRACT FROM INDEX REGISTER.

R2252 10. TIX BRANCH ON INDEX REGISTER AND DECREMENT.

```
 2253                                  01,2626          BANK   01

 2254  REF   1                 01,2626  0 2723 0  AXT   IC     TAGSUB      SELECT APPROPRIATE INDEX REGISTER.
 2255  REF  23 LAST1027        01,2627  3 0107 1        CA     POLISH
 2256  REF   4 LAST 957        01,2630  50 120 1  XSTORE INDEX  INDEXLOC    CONTAINS C(FIXLOC) OR C(FIXLOC)+1.
 2257  REF  22 LAST 967        01,2631  54 046 1        TS     X1
 2258  REF  47 LAST1035        01,2632  1 6125 0        ICF    DANZIG

 2259  REF   2 LAST1038        01,2633  0 2723 0  AXC   IC     TAGSUB
 2260  REF  24 LAST1038        01,2634  4 0107 0        CS     POLISH
 2261  REF   1                 01,2635  0 2630 0        IC     XSTORE

 2262  REF   1                 01,2636  0 2711 1  LXA   IC     15ADRERS    LOAD INDEX REGISTER FROM ERASABLE.
 2263  REF  25 LAST1038        01,2637  50 107 1        INDEX  POLISH
 2264                          01,2640  3 0000 1        CA     0
 2265  REF   2 LAST1038        01,2641  1 2630 1        ICF    XSTORE

 2266  REF   2 LAST1038        01,2642  0 2711 1  LXC   IC     15ADRERS    LOAD NDX REG FROM ERASABLE COMPLEMENTED.
 2267  REF  26 LAST1038        01,2643  50 107 1        INDEX  POLISH
 2268                          01,2644  4 0000 0        CS     0
 2269  REF   3 LAST1038        01,2645  1 2630 1        ICF    XSTORE

 2270  REF   3 LAST1038        01,2646  0 2711 1  SXA   IC     15ADRERS    STORE INDEX REGISTER IN ERASABLE.
 2271  REF   5 LAST1038        01,2647  50 120 1        INDEX  INDEXLOC
 2272  REF  23 LAST1038        01,2650  3 0046 0        CA     X1
 22725 REF  27 LAST1038        01,2651  50 107 1 MSTORE1 INDEX  POLISH
 2273                          01,2652  54 000 0        TS     0
 22735 REF  48 LAST1038        01,2653  1 6125 0        ICF    DANZIG
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```
2274  REF   4 LAST1038    01,2654  0 2711 1  XCHX    IC      15ADRERS    EXCHANGE INDEX REGISTER WITH ERASABLE.
2275  REF  28 LAST1038    01,2655  50 107 1          INDEX   POLISH
2276                      01,2656  3 0000 1          CA      0
2277  REF   6 LAST1038    01,2657  50 120 1          INDEX   INDEXLOC
2278  REF  24 LAST1038    01,2660  56 046 0          XCH     X1
2279  REF   1             01,2661  1 2651 0          ICF     MSTORE1

2280  REF   5 LAST1039    01,2662  0 2711 1  XAD     IC      15ADRERS    ADD ERASABLE TO INDEX REGISTER.
2281  REF  29 LAST1039    01,2663  50 107 1          INDEX   POLISH
2282                      01,2664  3 0000 1          CA      0
2283  REF   7 LAST1039    01,2665  50 120 1  XAD2    INDEX   INDEXLOC
2284  REF  25 LAST1039    01,2666  26 046 1          ADS     X1          IGNORING OVERFLOWS.
2285  REF  49 LAST1038    01,2667  1 6125 0          ICF     DANZIG

2286  REF   3 LAST1038    01,2670  0 2723 0  INCR    IC      TAGSUB      INCREMENT INDEX REGISTER.
2287  REF  30 LAST1039    01,2671  3 0107 1          CA      POLISH
2288  REF   1             01,2672  1 2665 1          ICF     XAD2

2289  REF   6 LAST1039    01,2673  0 2711 1  XSU     IC      15ADRERS    SUBTRACT ERASABLE FROM INDEX REGISTER.
2290  REF  31 LAST1039    01,2674  50 107 1          INDEX   POLISH
2291                      01,2675  4 0000 0          CS      0
2292  REF   2 LAST1039    01,2676  1 2665 1          ICF     XAD2


2293  REF   4 LAST1039    01,2677  0 2723 0  TIX     IC      TAGSUB      BRANCH AND DECREMENT ON INDEX.
2294  REF   8 LAST1039    01,2700  50 120 1          INDEX   INDEXLOC
2295  REF  35 LAST 936    01,2701  4 0050 0          CS      S1
2296  REF   9 LAST1039    01,2702  50 120 1          INDEX   INDEXLOC
2297  REF  26 LAST1039    01,2703  6 0046 0          AD      X1
2298                      01,2704  0 0006 1          EXTEND                  NO OPERATION IF DECREMENTED INDEX IS
2299  REF  50 LAST1039    01,2705  6 6125 1          BZMF    DANZIG          NEGATIVE OR ZERO.

2300  REF  10 LAST1039    01,2706  50 120 1  DOTIXBR  INDEX   INDEXLOC
2301  REF  27 LAST1039    01,2707  56 046 0          XCH     X1              IGNORING OVERFLOWS.

23012 REF   6 LAST1027    01,2710  1 6724 1          ICF     GOTO        DO THE BRANCH USING THE CADR IN POLISH.
```

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P23013 SUBROUTINE TO CONVERT AN ERASABLE ADDRESS (11 BITS) TO AN EBANK SETTING AND SUBADDRESS.

```
23015  REF  32 LAST1039   01,2711  4 0107 0  15ADRERS CS    POLISH
23016  REF   2 LAST 967   01,2712  6 5353 1            AD    DEC45
23017  REF 349 LAST1037   01,2713  10 000 0            CCS   A          DOES THE ADDRESS POINT TO THE WORK AREA?
23018  REF  46 LAST1027   01,2714  3 0110 1            CA    FIXLOC     YES.  ADD FIXLOC.  EBANK OK AS 15.
23019                      01,2715  1 2722 0            TCF   +5

2302   REF   8 LAST 967   01,2716  3 5352 0            CA    OCT1400    NO.  SET EBANK & MAKE UP SUBADDRESS.
23021  REF  33 LAST1040   01,2717  56 107 1            XCH   POLISH
23022  REF  71 LAST 975   01,2720  54 003 0            TS    EBANK
23023  REF  16 LAST 975   01,2721  7 4564 0            MASK  LOW8
23024  REF  34 LAST1040   01,2722  26 107 0  +5        ADS   POLISH     FALL INTO TAGSUB, AND RETURN VIA Q.
```

R2303 SUBROUTINE WHICH SETS THE ADDRESS OF THE SPECIFIED INDEX IN INDEXLOC. (ACTUALLY, THE ADDRESS -38D.)

```
2305   REF  47 LAST1040   01,2723  3 0110 1  TAGSUB  CA    FIXLOC
2306   REF  11 LAST1039   01,2724  54 120 0            TS    INDEXLOC

2307   REF  42 LAST1008   01,2725  10 020 1            CCS   CYR        BIT 15 SPECIFIES INDEX.
2308   REF  12 LAST1040   01,2726  24 120 1            INCR  INDEXLOC   0 MEANS USE X2.
2309.  REF 303 LAST1030   01,2727  0 0002 0            TC    Q
2310   REF 304 LAST1040   01,2730  0 0002 0            TC    Q          1 FOR X1.
```

L INTERPRETER USER'S OWN PAGE NO. 89 53 E3

P2311 MISCELLANEOUS OPERATION CODES WITH DIRECT ADDRESSES. INCLUDED HERE ARE:

R2313 1. ITA STORE QPRET (RETURN ADDRESS) IN ERASABLE.
R2315 2. CALL CALL A SUBROUTINE, LEAVING RETURN IN QPRET.
R2317 3. RTB RETURN TO BASIC LANGUAGE AT THE GIVEN ADDRESS.
R2319 4. BHIZ BRANCH IF THE HIGH ORDER OF MPAC IS ZERO (SINGLE PRECISION).
R2321 5. BOV BRANCH ON OVERFLOW.
R2322 6. GOTO SIMPLE SEQUENCE CHANGE.

```
 2323  REF  43 LAST1040     01,2731  10 020 1  RTB/BHIZ CCS     CYR
 2324  REF  35 LAST1040     01,2732  3 0107 1  RTB      CA      POLISH
 2325  REF  14 LAST 435     01,2733  1 5230 1           ICF     BANKJUMP       CALL BASIC ROUTINE.

 2326  REF 736 LAST1035     01,2734  10 144 1  BHIZ     CCS     MPAC
 2327  REF  51 LAST1039     01,2735  1 6125 0           ICF     DANZIG
 2328  REF   7 LAST1039     01,2736  1 6724 1           ICF     GOTO
 2329  REF  52 LAST1041     01,2737  1 6125 0           ICF     DANZIG
 2330  REF   8 LAST1041     01,2740  1 6724 1           ICF     GOTO

 2331  REF  22 LAST1028     01,2741  10 111 1  BOV(B)   CCS     OVFIND         BRANCH ON OVERFLOW TO BASIC OR INTERP.
 2332                       01,2742  1 2744 0           ICF     +2
 2333  REF  53 LAST1041     01,2743  1 6125 0           ICF     DANZIG
 2334  REF  23 LAST1041     01,2744  54 111 1           TS      OVFIND
 2335  REF  44 LAST1041     01,2745  10 020 1           CCS     CYR
 2336  REF   1              01,2746  1 2732 1           ICF     RTB            IF BASIC.
 2337                       01,2747  00360 1  B5TOB8    OCT     360
 2338  REF   9 LAST1041     01,2750  1 6724 1           ICF     GOTO
```

L INTERPRETER USER'S OWN PAGE NO. 90 53 E3

```
2339  REF  45 LAST1041   01,2751  10 020 1  BZE/GOTO CCS   CYR        SEE WHICH OP-CODE IS DESIRED.
2340  REF   6 LAST1034   01,2752  0 7001 1            TC    BRANCH     DO BZE.
2341  REF  54 LAST1041   01,2753  1 6125 0            ICF   DANZIG
2342  REF  10 LAST1041   01,2754  1 6724 1            ICF   GOTO       DO GOTO.
2343  REF  55 LAST1042   01,2755  1 6125 0            ICF   DANZIG

2344  REF  46 LAST1042   01,2756  10 020 1  BPL/BMN   CCS   CYR
2345  REF   1            01,2757  1 2765 0            ICF   BPL
2346                     01,2760   12000 1  5B10      DEC   5 B+10     SHIFTS OP CODE IN SWITCH INSTRUCTION ADR

2347  REF   7 LAST1042   01,2761  0 7001 1            TC    BRANCH     DO BMN.
2348  REF  56 LAST1042   01,2762  1 6125 0            ICF   DANZIG
2349  REF  57 LAST1042   01,2763  1 6125 0            ICF   DANZIG
2350  REF  11 LAST1042   01,2764  1 6724 1            ICF   GOTO       ONLY IF NNZ.

2351  REF   8 LAST1042   01,2765  0 7001 1  BPL       TC    BRANCH
2352  REF  12 LAST1042   01,2766  1 6724 1            ICF   GOTO       IF POSITIVE OR ZERO.
2353  REF  13 LAST1042   01,2767  1 6724 1            ICF   GOTO
2354  REF  58 LAST1042   01,2770  1 6125 0            ICF   DANZIG

2355  REF  47 LAST1042   01,2771  10 020 1  CALL/ITA  CCS   CYR
2356  REF   1            01,2772  1 6716 0            ICF   CALL

2357  REF  49 LAST 954   01,2773  0 4736 1            TC    CCSHOLE
2358  REF   7 LAST1039   01,2774  0 2711 1            TC    15ADRERS   STORE QPRET. (TAGSUB AFTER 15ADRERS IS
2358S REF  48 LAST1040   01,2775  50 110 1            INDEX FIXLOC     SLOW IN THIS CASE, BUT SAVES STORAGE.)
2359  REF   5 LAST1027   01,2776  3 0052 0            CA    QPRET
2360  REF   2 LAST1039   01,2777  1 2651 0            ICF   MSTORE1
```

```
R2361            THE FOLLOWING OPERATIONS ARE AVAILABLE FOR ALTERING AND TESTING INTERPRETIVE SWITCHES:

R2363   00       BONSET              SET A SWITCH AND DO A GOTO IF IT WAS ON.
R2364   01       SETGO               SET A SWITCH AND DO A GOTO.
R2365   02       BOFSET              SET A SWITCH AND DO A GOTO IF IT WAS OFF
R2366   03       SET                 SET A SWITCH.

R2367   04       BONINV              INVERT A SWITCH AND BRANCH IF IT WAS ON.
R2368   05       INVGO               INVERT A SWITCH AND DO A GOTO.
R2369   06       BOFINV              INVERT A SWITCH AND BRANCH IF IT WAS OFF
R2370   07       INVERT              INVERT A SWITCH.

R2371   10       BONCLR              CLEAR A SWITCH AND BRANCH IF IT WAS ON.
R2372   11       CLRGO               CLEAR A SWITCH AND DO A GOTO.
R2373   12       BOFCLR              CLEAR A SWITCH AND BRANCH IF IT WAS OFF.
R2374   13       CLEAR               CLEAR A SWITCH.

R2375   14       BON                 BRANCH IF A SWITCH WAS ON.
R2376   16       BOFF                BRANCH IF A SWITCH WAS OFF.


R2377            THE ADDRESS SUPPLIED WITH THE SWITCH INSTRUCTION IS INTERPRETED AS FOLLOWS:

R2379            BITS 1-4    SWITCH BIT NUMBER (1-15).
R2380            BITS 5-8    SWITCH OPERATION NUMBER.
R2381            BITS 9-     SWITCH WORD NUMBER (UP TO 64 SWITCH WORDS).

R2382            THE ADDRESS ITSELF IS MADE UP BY THE YUL SYSTEM ASSEMBLER. THE BRANCH INSTRUCTIONS REQUIRE TWO
R2384   ADDRESSES, THE SECOND TAKEN AS THE DIRECT (OR INDIRECT IF IN ERASABLE) ADDRESS OF THE BRANCH.


 2386   REF   3 LAST 801     01,3000  3 5343 0  SWITCHES CAF     LOW4          LEAVE THE SWITCH BIT IN  SWBIT  .
 2387   REF  36 LAST1041     01,3001  7 0107 0           MASK    POLISH
 2388   REF 350 LAST1040     01,3002  50 000 1           INDEX   A
 2389   REF  41 LAST1026     01,3003  3 7745 0           CAF     BIT15         (NUMBER FROM LEFT TO RIGHT.)
 2390   REF   1              01,3004  54 121 1           TS      SWBIT

 2391   REF  39 LAST 998     01,3005  3 7755 1           CAF     BIT7          LEAVE THE SWITCH NUMBER IN SWWORD.
 2392                        01,3006  0 0006 1           EXTEND
 2393   REF  37 LAST1043     01,3007  7 0107 0           MP      POLISH
 2394   REF   1              01,3010  54 120 0           TS      SWWORD

 2395                        01,3011  0 0004 0           INHINT                DURING SWITCH CHANGE SO RUPT CAN USE TOO
 2396   REF 351 LAST1043     01,3012  50 000 1           INDEX   A             LEAVE THE SWITCH WORD ITSELF IN L.
 2397   REF  37 LAST 672     01,3013  3 0074 1           CA      STATE
 2398   REF 305 LAST1040     01,3014  54 002 1           TS      Q             Q WILL BE USED AS A CHANNEL.
```

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```
2399  REF  40 LAST 997    01,3015  3 7751 0          CAF    BIT11
2400                      01,3016  0 0006 1          EXTEND                 DISPATCH SWITCH BIT OPERATION AS IN BITS
2401  REF  38 LAST1043    01,3017  7 0107 0          MP     POLISH          7-8 OF POLISH.
2402  REF   1              01,3020  7 3060 0          MASK   B3TOB4          GETS 4X2-BIT CODE.
2403  REF 352 LAST1043    01,3021  50 000 1          INDEX  A
2404                      01,3022  1 3023 1          TCF    +1

2405  REF   2 LAST1043    01,3023  3 0121 0  +1      CA     SWBIT           00 = SET SWITCH IN QUESTION.
2406                      01,3024  0 0006 1          EXTEND
2407  REF 306 LAST1043    01,3025  04 002 1          RXOR   Q
2408  REF   1              01,3026  1 3035 0          TCF    SWSTORE

2409  REF   3 LAST1044    01,3027  3 0121 0  +5      CA     SWBIT           01 = INVERT SWITCH.
2410                      01,3030  0 0006 1          EXTEND
2411  REF 307 LAST1044    01,3031  06 002 0          RXOR   Q
2412  REF   2 LAST1044    01,3032  1 3035 0          TCF    SWSTORE

2413  REF   4 LAST1044    01,3033  4 0121 1  +9D     CS     SWBIT           10 = CLEAR.
2414  REF 308 LAST1044    01,3034  7 0002 1          MASK   Q
2415  REF   2 LAST1043    01,3035  50 120 1  SWSTORE INDEX  SWWORD
2416  REF  38 LAST1043    01,3036  54 074 0          IS     STATE           NEW SWITCH WORD.
```

L INTERPRETER USER'S OWN PAGE NO. 93 53 E3

```
2417                          01,3037  0 0003 1  +13D    RELINT          11 = NOOP.
2418  REF  30 LAST 997        01,3040  3 7747 1          CAF    BIT13
2419                          01,3041  0 0006 1          EXTEND          DISPATCH SEQUCE CHANGING OR BRANCHING
2420  REF  39 LAST1044        01,3042  7 0107 0          MP     POLISH   CODE.
2421  REF   2 LAST1044        01,3043  7 3060 0          MASK   B3TOB4
2422  REF 353 LAST1044        01,3044 50 000 1          INDEX  A
2423                          01,3045  1 3046 1          TCF    +1       ORIGINALLY STORED IN BITS 5-6.

2424  REF 309 LAST1044        01,3046  4 0002 1  +1     CS     Q        00 = BRANCH IF ON.
2425  REF   5 LAST1044        01,3047  7 0121 1  TEST   MASK   SWBIT
2426  REF 354 LAST1045        01,3050 10 000 0          CCS    A
2427  REF   1                 01,3051  1 3061 1          TCF    SWSKIP

2428  REF   1                 01,3052  1 6773 0  +5     TCF    SWBRANCH 01 = GO TO.

2429  REF   2 LAST1045        01,3053  1 3061 1          TCF    SWSKIP   HERE ONLY ON BIT 15.

2430  REF  50 LAST1042        01,3054  0 4736 1          IC     CCSHOLE
2431  REF  51 LAST1045        01,3055  0 4736 1          IC     CCSHOLE

2432  REF 310 LAST1045        01,3056  3 0002 0  +9D    CA     Q        10 = BRANCH IF OFF.
2433  REF   1                 01,3057  1 3047 0          TCF    TEST

2434                          01,3060    00014 1 B3TOB4  DCI    14

2435  REF  30 LAST 976        01,3061 24 154 1  SWSKIP INCR   LOC

2436  REF   1                         01,3000  SW/     EQUALS SWITCHES

2437  REF  59 LAST1042        01,3062  1 6125 0  +13D    TCF    DANZIG   11 = NOOP.
```

L SINGLE PRECISION SUBROUTINES USER'S OWN PAGE NO. 1 53

```
0001                                    5354            BLOCK   02
R0002   SINGLE PRECISION SINE AND COSINE

0003    REF  32 LAST1037        5354  6 7746 0  SPCOS   AD      HALF            ARGUMENTS SCALED AT PI
0004    REF   1                 5355  55'130 0  SPSIN   TS      TEMK
0005    REF   1                 5356  1 5360 0          ICF     SPT
0006    REF   2 LAST1046        5357  4 1130 0          CS      TEMK
0007                            5360  6 0000 1  SPT     DOUBLE
0008    REF   3 LAST1046        5361  55'130 0          TS      TEMK
0009    REF   1                 5362  1 5373 1          ICF     POLLEY
0010    REF   4 LAST1046        5363  57'130 1          XCH     TEMK
0011    REF   5 LAST1046        5364  51'130 1          INDEX   TEMK
0012    REF   4 LAST 580        5365  6 7744 1          AD      LIMITS
0013                            5366  4 0000 0          COM
0014    REF   6 LAST1046        5367  6 1130 1          AD      TEMK
0015    REF   7 LAST1046        5370  55'130 0          TS      TEMK
0016    REF   2 LAST1046        5371  1 5373 1          ICF     POLLEY
0017    REF   1                 5372  1 5411 1          ICF     ARG90
0018                            5373  0 0006 1  POLLEY  EXTEND
0019    REF   8 LAST1046        5374  7 1130 0          MP      TEMK
0020    REF   1                 5375  55'131 1          TS      SQ
0021                            5376  0 0006 1          EXTEND
0022    REF   1                 5377  7 5416 0          MP      C5/2
0023    REF   1                 5400  6 5415 1          AD      C3/2
0024                            5401  0 0006 1          EXTEND
0025    REF   2 LAST1046        5402  7 1131 1          MP      SQ
0026    REF   1                 5403  6 5414 0          AD      C1/2
0027                            5404  0 0006 1          EXTEND
0028    REF   9 LAST1046        5405  7 1130 0          MP      TEMK
0029                            5406  20 001 1          DDOUBL
0030    REF  10 LAST1046        5407  55'130 0          TS      TEMK
0031    REF 311 LAST1045        5410  0 0002 0          TC      Q
0032    REF 355 LAST1045        5411  50 000 1  ARG90   INDEX   A
0033    REF   5 LAST1046        5412  4 7744 0          CS      LIMITS
0034    REF 312 LAST1046        5413  0 0002 0          TC      Q               RESULT SCALED AT 1
0035                            5414   31103 1  C1/2    DEC     .7853134
0036                            5415   65552 0  C3/2    DEC     -.3216146
0037                            5416   01124 1  C5/2    DEC     .0363551
```

L SINGLE PRECISION SUBROUTINES USER'S OWN PAGE NO. 2 53

R0038 ENTER WITH ARGUMENT IN A, EXIT WITH ROOT IN A. IF GIVEN A NEGATIVE ARGUMENT, THE RETURN SKIPS WITH CCS RESULT.
R0040 MINUS ZERO RETURNS LIKE PLUS ZERO.
R0041 MAXIMUM ERROR IN ANSWER IS NO GREATER THAN 2 BITS.
R0042 INTERRUPT PROGRAMS USING SPROOT MUST SAVE AND RESTORE SR.

```
0043   REF   1                5417  55'132 I  SPROOT   TS      SQRARG          ENTER WITH C(A) = Y
0044   REF 356 LAST1046       5420  10 000 0            CCS     A
0045   REF   1                5421  1 5425 0            TCF     POSARG          IF PNZ, CONTINUE
0046   REF 313 LAST1046       5422  0 0002 0            TC      Q               RETURN WITH 0 FOR +0
0047   REF 314 LAST1047       5423  24 002 0            INCR    Q
0048   REF 315 LAST1047       5424  0 0002 0            TC      Q               RETURN WITH 0 FOR -0

0049                          5425  0 0006 1  POSARG    EXTEND
0050   REF   2 LAST  27       5426  23'131 0            QXCH    ROOTRET         WILL BE CALLING SPROOT1
0051   REF   1                5427  6 5504 0            AD      63/64+1         B(A) = Y - 1
0052                          5430  54 000 0            OVSK
0053   REF   1                5431  1 5473 0            TCF     SPROOT2
0054   REF   2 LAST1047       5432  57'132 0            XCH     SQRARG          ARG JUGGLING

0055   REF   3 LAST1047       5433  55'132 I  SPROOT3   TS      SQRARG
0056   REF  34 LAST1031       5434  54 021 0            TS      SR              C(A) = Y
0057   REF  35 LAST1047       5435  56 021 1            XCH     SR              (LOSE 1 BIT)
0058   REF   2 LAST  27       5436  55'130 0            TS      HALFY           HALFY = Y/2
0059   REF   2 LAST 172       5437  6 5502 0            AD      -1/8            FORM Y/2 - 1/8
0060   REF 357 LAST1047       5440  10 000 0            CCS     A               TEST FOR FIRST GUESS
0061   REF   1                5441  6 5503 1            AD      5/8+1           Y .GE. 1/4, X = Y/2 + 1/2
0062   REF   1                5442  0 5447 0            TC      HIGUESS         +0 IMPOSSIBLE FROM ADDITION
0063                          5443  1 5444 1            NOOP                    Y .LE. 1/4, X/2 = Y + 1/16
0064   REF  41 LAST1044       5444  3 7751 0            CAF     BIT11           1/16
0065   REF   4 LAST1047       5445  6 1132 0            AD      SQRARG          SQRARG = Y
0066                          5446  6 0000 1            DOUBLE                  X FROM X/2
0067   REF   1                5447  0 5462 1  HIGUESS   TC      SPROOT1
0068   REF   2 LAST1047       5450  0 5462 1            TC      SPROOT1         ITERATE TWICE
0069   REF   3 LAST1047       5451  57'131 0            XCH     ROOTRET         SAVE ANSWER AND GET Q
0070   REF 358 LAST1047       5452  10 000 0            CCS     A
0071   REF   4 LAST1047       5453  57'131 0            XCH     ROOTRET         NO SHIFT NEEDED
0072   REF   1                5454  0 5460 0            TC      ROOTBCK
0073   REF   5 LAST1047       5455  57'131 0            XCH     ROOTRET         Q NEG, SHIFT RIGHT THREE
0074                          5456  0 0006 1            EXTEND
0075   REF  28 LAST 909        5457  7 7750 0            MP      BIT12           EXP -3
0076   REF   6 LAST1047       5460  51'131 0  ROOTBCK   INDEX   ROOTRET         ROOTRET = Q - 1
0077                          5461  0 0001 0            TC      1               RETURN, C(A) = SQRT(Y)

0078   REF  36 LAST1047       5462  56 021 1  SPROOT1   XCH     SR              SR = X/2
0079   REF   3 LAST1047       5463  4 1130 0            CS      HALFY           NEWTON ITER  X = X/2 + (Y/2 / X/2) / 2
0080                          5464  22 007 0            ZL
0081                          5465  0 0006 1            EXTEND
0082   REF  37 LAST1047       5466  10 021 0            DV      SR              C(SR) = X/2 DV DOES NOT EDIT
```

L SINGLE PRECISION SUBROUTINES USER'S OWN PAGE NO. 3 S3

```
0083  REF  38 LAST1047      5467  56 021 1          XCH     SR
0084                        5470  0 0006 1          EXTEND
0085  REF  39 LAST1048      5471  60 021 1          SU      SR
0086  REF 316 LAST1047      5472  0 0002 0          TC      Q               C(A) = X (NEXT)

0087  REF   7 LAST1047      5473  4 1131 1  SPROOT2 CS      ROOTRET         SET RETURN Q NEG, AS FLAG
0088  REF   8 LAST1048      5474  55,131 1          TS      ROOTRET
0089  REF  40 LAST1043      5475  3 7755 1          CAF     BIT7            SHIFT FOR SIGNIFCANCE
0090                        5476  0 0006 1          EXTEND
0091  REF   5 LAST1047      5477  7 1132 1          MP      SQRARG
0092  REF 184 LAST1032      5500  3 0001 0          CA      L               B(A) = 0
0093  REF   1               5501  0 5433 0          TC      SPROOT3

0094                        5502   73777 1  -1/8     OCTAL   73777
0095                        5503   24001 0  5/8+1    OCTAL   24001
0096                        5504   37401 0  63/64+1  OCTAL   37401
```

L EXECUTIVE USER'S OWN PAGE NO. 1 53

```
0001                                    5505            BLOCK  02
R0002           TO ENTER A JOB REQUEST REQUIRING NO VAC AREA:

0003   REF   4 LAST 805        5505  54 063 0  NOVAC     TS      NEWPRIO         SAVE PRIORITY OF NEW JOB.
0004                           5506  0 0006 1            EXTEND
0005   REF 317 LAST1048        5507  5 0002 0            INDEX   Q               Q WILL BE UNDISTURBED THROUGHOUT.
0006                           5510  3 0001 0            DCA     0               2CADR OF JOB ENTERED.
0007   REF   1                 5511  52 066 0            DXCH    NEWLOC
0008   REF   1                 5512  3 5575 0            CAF     EXECBANK
0009   REF  25 LAST 995        5513  56 004 0            XCH     FBANK
0010   REF   1                 5514  54 061 1            TS      EXECTEM1
0011   REF   1                 5515  1 3105 1            TCF     NOVAC2          ENTER EXECUTIVE BANK.

R0012           TO ENTER A JOB REQUEST REQUIRING A VAC AREA - E.G., ALL (PARTIALLY) INTERPRETIVE JOBS.

0014   REF   5 LAST1049        5516  54 063 0  FINDVAC   TS      NEWPRIO
0015                           5517  0 0006 1            EXTEND
0016   REF 318 LAST1049        5520  5 0002 0            INDEX   Q
0017                           5521  3 0001 0            DCA     0
0018   REF   2 LAST1049        5522  52 066 0            DXCH    NEWLOC
0019   REF   2 LAST1049        5523  3 5575 0            CAF     EXECBANK
0020   REF  26 LAST1049        5524  56 004 0            XCH     FBANK
0021   REF   1                 5525  1 3063 0            TCF     FINDVAC2        OFF TO EXECUTIVE SWITCHED-BANK.

R00211          TO ENTER A FINDVAC WITH THE PRIORITY IN NEWPRIO TO THE 2CADR ARRIVING IN A AND L:

00213  REF 319 LAST1049        5526  56 002 0  SPVAC     XCH     Q
00214  REF   4 LAST 410        5527  6 5336 1            AD      NEG2
00215  REF 320 LAST1049        5530  56 002 0            XCH     Q
00216  REF  32 LAST 916        5531  1 5522 0            TCF     FINDVAC +4

R0022           TO SUSPEND A BASIC JOB SO A HIGHER PRIORITY JOB MAY BE SERVICED:

0024   REF   3 LAST1049        5532  3 5575 0  CHANG1    CAF     EXECBANK
0025   REF 185 LAST1048        5533  54 001 1            TS      L
0026   REF 321 LAST1049        5534  3 0002 0            CA      Q
0027   REF  24 LAST 976        5535  22 006 1            LXCH    BBANK
0028                           5536  0 0004 0    +4      INHINT
0029   REF   1                 5537  1 3163 1            TCF     CHANJOB

R0030           TO SUSPEND AN INTERPRETIVE JOB:

0031   REF   4 LAST1049        5540  3 5575 0  CHANG2    CAF     EXECBANK
R00315          ITRACE (4) REFERS TO "CHANG2".
0032   REF  25 LAST1049        5541  54 006 0            TS      BBANK
0033   REF  31 LAST1045        5542  4 0154 0            CS      LOC             NEGATIVE LOC SHOWS JOB = INTERPRETIVE.
00335  REF  10 LAST 976         5543  22 155 0            LXCH    BANKSET         BANKSET, NOT BBANK, HAS RIGHT CONTENTS.
0034   REF   9 LAST 916        5544  1 5536 0            TCF     CHANG1 +4
```

```
P0035           TO VOLUNTARILY SUSPEND A JOB UNTIL THE COMPLETION OF SOME ANTICIPATED EVENT (I/O EVENT ETC.):

 0037   REF  32 LAST1049        5545  54 154 0  JOBSLEEP  TS      LOC
 0038   REF   5 LAST1049        5546  3 5575 0            CAF     EXECBANK
 0039   REF  27 LAST1049        5547  54 004 1            TS      FBANK
 0040   REF   1                 5550  1 3244 1            TCF     JOBSLP1

R0041           TO AWAKEN A JOB PUT TO SLEEP IN THE ABOVE FASHION:

 0042   REF   3 LAST1049        5551  54 065 0  JOBWAKE   TS      NEWLOC
 0043   REF 104 LAST 992        5552  4 7762 1            CS      TWO         EXIT IS VIA FINDVAC/NOVAC PROCEDURES.
 0044   REF 322 LAST1049        5553  26 002 1            ADS     Q
 0045   REF   6 LAST1050        5554  3 5575 0            CAF     EXECBANK
 0046   REF  28 LAST1050        5555  56 004 0            XCH     FBANK
 0047   REF   1                 5556  1 3255 1            TCF     JOBWAKE2

R0048           TO CHANGE THE PRIORITY OF A JOB CURRENTLY UNDER EXECUTION:

 0049                           5557  0 0004 0  PRIOCHNG  INHINT                NEW PRIORITY ARRIVES IN A. RETURNS TO
 0050   REF   6 LAST1049        5560  54 063 0            TS      NEWPRIO     CALLER AS SOON AS NEW JOB PRIORITY IS
 0051   REF   7 LAST1050        5561  3 5575 0            CAF     EXECBANK    HIGHEST. PREPARE FOR POSSIBLE BASIC-
 0052   REF  26 LAST1049        5562  56 006 1            XCH     BBANK       STYLE CHANGE-JOB.
 0053   REF  11 LAST1049        5563  54 155 1            TS      BANKSET
 0054   REF 323 LAST1050        5564  3 0002 0            CA      Q
 0055   REF   1                 5565  1 3324 0            TCF     PRIOCH2

R0056           TO FREE THE DISPLAY BEFORE ENDOFJOB:

 0057   REF  14 LAST 418        5566  0 4724 1  EJFREE    IC      FREEDSP

R0058           TO REMOVE A JOB FROM EXECUTIVE CONSIDERATIONS:

 0059   REF   8 LAST1050        5567  3 5575 0  ENDOFJOB  CAF     EXECBANK
 0060   REF  29 LAST1050        5570  54 004 1            TS      FBANK
 0061   REF   1                 5571  1 3335 0            TCF     ENDJOB1

 0062   REF   2 LAST1049        5572  3 0061 0  ENDFIND   CA      EXECTEM1    RETURN TO CALLER AFTER JOB ENTRY
 0063   REF  30 LAST1050        5573  54 004 1            TS      FBANK       COMPLETE.
 0064   REF   5 LAST 290        5574  1 7017 1            TCF     Q+2
 0066   REF   2 LAST1049        5575   03063 1  EXECBANK  CADR    FINDVAC2
```

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P0067 LOCATE AN AVAILABLE VAC AREA.

```
0068                                    01,3063                 BANK    01
0069  REF   3 LAST1050     01,3063   54 061 1   FINDVAC2  IS    EXECTEM1    (SAVE CALLER'S BANK FIRST.)
0070  REF   4 LAST 159     01,3064   10 430 1              CCS   VAC1USE
0071  REF   1              01,3065   1 3100 1              TCF   VACFOUND
0072  REF   3 LAST 159     01,3066   10 504 1              CCS   VAC2USE
0073  REF   2 LAST1051     01,3067   1 3100 1              TCF   VACFOUND
0074  REF   3 LAST 159     01,3070   10 560 0              CCS   VAC3USE
0075  REF   3 LAST1051     01,3071   1 3100 1              TCF   VACFOUND
0076  REF   3 LAST 159     01,3072   10 634 1              CCS   VAC4USE
0077  REF   4 LAST1051     01,3073   1 3100 1              TCF   VACFOUND
0078  REF   3 LAST 159     01,3074   10 710 0              CCS   VAC5USE
0079  REF   5 LAST1051     01,3075   1 3100 1              TCF   VACFOUND
0080  REF   8 LAST1036     01,3076   0 6000 1              TC    ABORT
0081                       01,3077    01201 0             UCI   1201        NO VAC AREAS.

0082  REF 105 LAST1050     01,3100   6 7762 0   VACFOUND  AD    TWO         RESERVE THIS VAC AREA BY STORING A ZERO
0083                       01,3101   22 007 0              ZL                IN ITS VAC USE REGISTER AND STORE THE
0084  REF 359 LAST1047     01,3102   50 000 1              INDEX A           ADDRESS OF THE FIRST WORD OF IT IN THE
0085                       01,3103   21'777 0              LXCH  0 -1        LOW NINE BITS OF THE PRIORITY WORD.
0086  REF   7 LAST1050     01,3104   26 063 0              ADS   NEWPRIO

0087  REF 294 LAST1037     01,3105   3 7767 0   NOVAC2    CAF   ZERO       NOVAC ENTERS HERE. FIND A CORE SET.
0088  REF   8 LAST 291     01,3106   54 064 1              IS    LOCCTR
0089  REF   1              01,3107   3 3114 0              CAF   NO.CORES    SEVEN SETS OF ELEVEN REGISTERS EACH.
0090  REF   1              01,3110   54 062 1   NOVAC3    IS    EXECTEM2
0091  REF   9 LAST1051     01,3111   50 064 0              INDEX LOCCTR
0092  REF   8 LAST  97     01,3112   10 157 0              CCS   PRIORITY    EACH PRIORITY REGISTER CONTAINS -0 IF
0093  REF   1              01,3113   1 3154 0              TCF   NEXTCORE    THE CORRESPONDING CORE SET IS AVAILABLE.
0094                       01,3114    00006 1   NO.CORES  DEC   6
0095  REF   2 LAST1051     01,3115   1 3154 0              TCF   NEXTCORE    AN ACTIVE JOB HAS A POSITIVE PRIORITY
A0096                                                                       BUT A DORMANT JOB'S PRIORITY IS NEGATIVE
```

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```
0097  REF   8 LAST1051   01,3116  3 0063 1  CORFOUND CA    NEWPRIO    SET THE PRIORITY OF THIS JOB IN THE CORE
0098  REF  10 LAST1051   01,3117  50 064 0            INDEX  LOCCTR    SET'S PRIORITY REGISTER AND SET THE
0099  REF   9 LAST1051   01,3120  54 157 0            IS     PRIORITY  JOB'S PUSH-DOWN POINTER AT THE BEGINNING
0100  REF   5 LAST 164   01,3121  7 5341 0            MASK   LOW9      OF THE WORK AREA AND OVERFLOW INDICATOR
0101  REF  11 LAST1052   01,3122  50 064 0            INDEX  LOCCTR
0102  REF  20 LAST1027   01,3123  54 156 1            IS     PUSHLOC   OFF TO PREPARE FOR INTERPRETIVE PROGRAMS

0103  REF  12 LAST1052   01,3124  10 064 1            CCS    LOCCTR    IF CORE SET ZERO IS BEING LOADED, SET UP
0104  REF   1            01,3125  1 3141 1            TCF    SETLOC    OVFIND AND FIXLOC IMMEDIATELY .
0105  REF  24 LAST1041   01,3126  54 111 1            IS     OVFIND
0106  REF  21 LAST1052   01,3127  3 0156 0            CA     PUSHLOC
0107  REF  49 LAST1042   01,3130  54 110 0            IS     FIXLOC

0108  REF  11 LAST 954   01,3131  10 067 1  SPECTEST CCS    NEWJOB     SEE IF ANY ACTIVE JOBS WAITING (RARE).
0109  REF   2 LAST1052   01,3132  1 3141 1            TCF    SETLOC     MUST BE AWAKENED BUT UNCHANGED JOB.
0110  REF  52 LAST1045   01,3133  0 4736 1            TC     CCSHOLE
0111  REF  53 LAST1052   01,3134  0 4736 1            TC     CCSHOLE
0112  REF  12 LAST1052   01,3135  54 067 1            IS     NEWJOB     +0 SHOWS ACTIVE JOB ALREADY SET.
0113  REF   4 LAST1050   01,3136  52 066 0            DXCH   NEWLOC
0114  REF  33 LAST1050   01,3137  52 155 1            DXCH   LOC
0115  REF   1            01,3140  1 5572 0            TCF    ENDFIND

0116  REF   5 LAST1052   01,3141  52 066 0  SETLOC    DXCH   NEWLOC     SET UP THE LOCATION REGISTERS FOR THIS
0117  REF  13 LAST1052   01,3142  50 064 0            INDEX  LOCCTR
0118  REF  34 LAST1052   01,3143  52 155 1            DXCH   LOC
0119  REF  13 LAST1052   01,3144  50 067 0            INDEX  NEWJOB     THIS INDEX INSTRUCTION INSURES THAT THE
0120  REF  10 LAST1052   01,3145  4 0157 0            CS     PRIORITY   HIGHEST ACTIVE PRIORITY WILL BE COMPARED
0121  REF   9 LAST1052   01,3146  6 0063 1            AD     NEWPRIO    WITH THE NEW PRIORITY TO SEE IF NEWJOB
0122                     01,3147  0 0006 1            EXTEND             SHOULD BE SET TO SIGNAL A SWITCH.
0123  REF   2 LAST1052   01,3150  6 5572 1            BZMF   ENDFIND
0124  REF  14 LAST1052   01,3151  3 0064 0            CA     LOCCTR     LOCCTR IS LEFT SET AT THIS CORE SET IF
0125  REF  14 LAST1052   01,3152  54 067 1            IS     NEWJOB     THE CALLER WANTS TO LOAD ANY MPAC
0126  REF   3 LAST1052   01,3153  1 5572 0            TCF    ENDFIND    REGISTERS, ETC.

0127  REF   1            01,3154  3 3265 0  NEXTCORE CAF    CORE1NC
0128  REF  15 LAST1052   01,3155  26 064 1            ADS    LOCCTR
0129  REF   2 LAST1051   01,3156  10 062 1            CCS    EXECTEM2
0130  REF   1            01,3157  1 3110 0            TCF    NOVAC3
0131  REF   9 LAST1051   01,3160  0 6000 1            TC     ABORT      NO CORE SETS.
0132                     01,3161  01202 0             OCT    1202
```

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P0133 THE FOLLOWING ROUTINE SWAPS CORE SET 0 WITH THAT WHOSE RELATIVE ADDRESS IS IN NEWJOB.

```
0135   REF  35 LAST1052     01,3162  52 155 1   -1        DXCH   LOC
0136   REF  15 LAST1052     01,3163  50 067 0   CHANJOB   INDEX  NEWJOB        LOC ARRIVES IN A AND BBANK IN L.
0137   REF  36 LAST1053     01,3164  52 155 1             DXCH   LOC
0138   REF  37 LAST1053     01,3165  52 155 1             DXCH   LOC

0139   REF 737 LAST1041     01,3166  52 145 0             DXCH   MPAC          SWAP MULTI-PURPOSE ACCUMULATOR AREAS.
0140   REF  16 LAST1053     01,3167  50 067 0             INDEX  NEWJOB
0141   REF 738 LAST1053     01,3170  52 145 0             DXCH   MPAC
0142   REF 739 LAST1053     01,3171  52 145 0             DXCH   MPAC
0143   REF 740 LAST1053     01,3172  52 147 1             DXCH   MPAC +2
0144   REF  17 LAST1053     01,3173  50 067 0             INDEX  NEWJOB
0145   REF 741 LAST1053     01,3174  52 147 1             DXCH   MPAC +2
0146   REF 742 LAST1053     01,3175  52 147 1             DXCH   MPAC +2
0147   REF 743 LAST1053     01,3176  52 151 0             DXCH   MPAC +4
0148   REF  18 LAST1053     01,3177  50 067 0             INDEX  NEWJOB
0149   REF 744 LAST1053     01,3200  52 151 0             DXCH   MPAC +4
0150   REF 745 LAST1053     01,3201  52 151 0             DXCH   MPAC +4
0151   REF 746 LAST1053     01,3202  52 153 1             DXCH   MPAC +6
0152   REF  19 LAST1053     01,3203  50 067 0             INDEX  NEWJOB
0153   REF 747 LAST1053     01,3204  52 153 1             DXCH   MPAC +6
0154   REF 748 LAST1053     01,3205  52 153 1             DXCH   MPAC +6

0155   REF 295 LAST1051     01,3206  3 7767 0             CAF    ZERO
0156   REF  25 LAST1052     01,3207  56 111 0             XCH    OVFIND        MAKE PUSHLOC NEGATIVE IF OVFIND NZ.
0157                        01,3210  0 0006 1             EXTEND
0158                        01,3211  1 3214 1             BZF    +3
0159   REF  22 LAST1052     01,3212  4 0156 1             CS     PUSHLOC
0160   REF  23 LAST1053     01,3213  54 156 1             TS     PUSHLOC

0161   REF  24 LAST1053     01,3214  52 157 0             DXCH   PUSHLOC
0162   REF  20 LAST1053     01,3215  50 067 0             INDEX  NEWJOB
0163   REF  25 LAST1053     01,3216  52 157 0             DXCH   PUSHLOC
0164   REF  26 LAST1053     01,3217  52 157 0             DXCH   PUSHLOC       SWAPS PUSHLOC AND PRIORITY.
0165   REF   6 LAST1052     01,3220  3 5341 1             CAF    LOW9          SET FIXLOC TO BASE OF VAC AREA.
0166   REF  11 LAST1052     01,3221  7 0157 0             MASK   PRIORITY
0167   REF  50 LAST1052     01,3222  54 110 0             TS     FIXLOC

0168   REF  27 LAST1053     01,3223  10 156 1             CCS    PUSHLOC       SET OVERFLOW INDICATOR ACCORDING TO
0169   REF 296 LAST1053     01,3224  3 7767 0             CAF    ZERO
0170   REF   1              01,3225  1 3232 0             TCF    ENDPRCHG -1
0171   REF  28 LAST1053     01,3226  4 0156 1             CS     PUSHLOC
0172   REF  29 LAST1053     01,3227  54 156 1             TS     PUSHLOC
0173   REF 173 LAST1027     01,3230  3 7763 1             CAF    ONE
0174   REF  26 LAST1053     01,3231  56 111 0             XCH    OVFIND
0175   REF  21 LAST1053     01,3232  54 067 1             TS     NEWJOB

0176                        01,3233  0 0003 1  ENDPRCHG  RELINT
0177   REF  38 LAST1053     01,3234  52 155 1             DXCH   LOC           BASIC JOBS HAVE POSITIVE ADDRESSES, SO
```

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```
0178                01,3235  0 0006 1      EXTEND          DISPATCH WITH A DTCB.
0179                01,3236  6 3240 1      BZMF    +2      IF INTERPRETIVE, SET UP EBANK, ETC.
0180                01,3237  52 006 0      DTCB
```

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```
 0181                          01,3240  4 0000 0          COM                 EPILOGUE TO JOB CHANGE FOR INTERPRETIVE
 0182   REF 174 LAST1053       01,3241  6 7763 1          AD      ONE
 0183   REF  39 LAST1053       01,3242  54 154 0          IS      LOC         RESUME.
 0186   REF   1                01,3243  1 6122 1          ICF     INTRSM

R0187           COMPLETE JOBSLEEP PREPARATIONS.

 0188                          01,3244  0 0004 0  JOBSLP1  INHINT
 0189   REF  12 LAST1053       01,3245  4 0157 0          CS      PRIORITY    NNZ PRIORITY SHOWS JOB ASLEEP.
 0190   REF  13 LAST1055       01,3246  54 157 0          IS      PRIORITY
 0191   REF   7 LAST 994       01,3247  3 5342 1          CAF     LOW7
 0192   REF  27 LAST1050       01,3250  7 0006 0          MASK    BBANK
 0193   REF  12 LAST1050       01,3251  54 155 1          IS      BANKSET
 0194   REF 297 LAST1053       01,3252  4 7767 1          CS      ZERO
 0195   REF 134 LAST1037       01,3253  54 121 1  JOBSLP2  IS      BUF +1      HOLDS - HIGHEST PRIORITY.
 0196   REF   1                01,3254  1 3345 1          ICF     EJSCAN      SCAN FOR HIGHEST PRIORITY ALA ENDOFJOB.
```

```
P0197           TO WAKE UP A JOB, EACH CORE SET IS FOUND TO LOCATE ALL JOBS WHICH ARE ASLEEP. IF THE FCADR IN THE
R0199   LOC REGISTER OF ANY SUCH JOB MATCHES THAT SUPPLIED BY THE CALLER, THAT JOB IS AWAKENED. IF NO JOB IS FOUND,
R0201   LOCCTR IS SET TO -1 AND NO FURTHER ACTION TAKES PLACE.

0202   REF   4 LAST1051   01,3255  54 061 1  JOBWAKE2 TS      EXECTEM1
0203   REF 298 LAST1055   01,3256  3 7767 0           CAF     ZERO          BEGIN CORE SET SCAN.
0204   REF  16 LAST1052   01,3257  54 064 1           TS      LOCCTR
0205   REF   2 LAST1051   01,3260  3 3114 0           CAF     NO.CORES
0206   REF   3 LAST1052   01,3261  54 062 1  JOBWAKE4 TS      EXECTEM2
0207   REF  17 LAST1056   01,3262  50 064 0           INDEX   LOCCTR
0208   REF  14 LAST1055   01,3263  10 157 0           CCS     PRIORITY
0209   REF   1            01,3264  1 3267 0           TCF     JOBWAKE3      ACTIVE JOB - CHECK NEXT CORE SET.
0210                      01,3265   00014 1  COREINC  DEC     12            12 REGISTERS PER CORE SET.
0211   REF   1            01,3266  1 3276 0           TCF     WAKETEST      SLEEPING JOB - SEE IF CADR MATCHES.

0212   REF   2 LAST1052   01,3267  3 3265 0  JOBWAKE3 CAF     COREINC
0213   REF  18 LAST1056   01,3270  26 064 1           ADS     LOCCTR
0214   REF   4 LAST1056   01,3271  10 062 1           CCS     EXECTEM2
0215   REF   1            01,3272  1 3261 0           TCF     JOBWAKE4
0216   REF 175 LAST1055   01,3273  4 7763 0           CS      ONE           EXIT IF SLEEPING JOB NOT FOUND.
0217   REF  19 LAST1056   01,3274  54 064 1           TS      LOCCTR
0218   REF   4 LAST1052   01,3275  1 5574 0           TCF     ENDFIND

0219   REF   6 LAST1052   01,3276  4 0065 0  WAKETEST CS      NEWLOC
0220   REF  20 LAST1056   01,3277  50 064 0           INDEX   LOCCTR
0221   REF  40 LAST1055   01,3300  6 0154 1           AD      LOC
0222                      01,3301  0 0006 1           EXTEND
0223                      01,3302  1 3304 1           BZF     +2            IF MATCH,
0224   REF   2 LAST1056   01,3303  1 3267 0           TCF     JOBWAKE3      EXAMINE NEXT CORE SET IF NO MATCH.

0225   REF  21 LAST1056   01,3304  50 064 0           INDEX   LOCCTR        RE-COMPLEMENT PRIORITY TO SHOW JOB AWAKE
0226   REF  15 LAST1056   01,3305  4 0157 0           CS      PRIORITY
0227   REF  10 LAST1052   01,3306  54 063 0           TS      NEWPRIO
0228   REF  22 LAST1056   01,3307  50 064 0           INDEX   LOCCTR
0229   REF  16 LAST1056   01,3310  54 157 0           TS      PRIORITY

0230   REF   1            01,3311  4 6341 0           CS      FBANKMSK      MAKE UP THE 2CADR OF THE WAKE ADDRESS
0231   REF   7 LAST1056   01,3312  7 0065 0           MASK    NEWLOC        USING THE CADR IN NEWLOC AND THE EBANK
0232   REF   3 LAST 974   01,3313  6 7751 0           AD      2K            HALF OF BBANK SAVED IN BANKSET.
0233   REF   8 LAST1056   01,3314  56 065 1           XCH     NEWLOC
0234   REF   2 LAST1056   01,3315  7 6341 0           MASK    FBANKMSK
0235   REF  23 LAST1056   01,3316  50 064 0           INDEX   LOCCTR
0236   REF  13 LAST1055   01,3317  6 0155 0           AD      BANKSET
0237   REF   9 LAST1056   01,3320  54 066 0           TS      NEWLOC +1

0238   REF  24 LAST1056   01,3321  10 064 1           CCS     LOCCTR        SPECIAL TREATMENT IF THIS JOB WAS
0239   REF   3 LAST1052   01,3322  1 3141 1           TCF     SETLOC        ALREADY IN THE RUN (0) POSITION.
0240   REF   1            01,3323  1 3131 0           TCF     SPECTEST
```

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P0241 PRIORITY CHANGE. CHANGE THE CONTENTS OF PRIORITY AND SCAN FOR THE JOB OF HIGHEST PRIORITY.

```
0243   REF  41 LAST1056    01,3324  54 154 0  PRIOCH2  TS     LOC
0244   REF 299 LAST1056    01,3325  3 7767 0           CAF    ZERO        SET FLAG TO TELL ENDJOB SCANNER IF THIS
0245   REF 135 LAST1055    01,3326  54 120 0           TS     BUF         JOB IS STILL HIGHEST PRIORITY.
0246   REF   7 LAST1053    01,3327  3 5341 1           CAF    LOW9
0247   REF  17 LAST1056    01,3330  7 0157 0           MASK   PRIORITY
0248   REF  11 LAST1056    01,3331  6 0063 1           AD     NEWPRIO
0249   REF  18 LAST1057    01,3332  54 157 0           TS     PRIORITY
0250                        01,3333  4 0000 0           COM
0251   REF   1              01,3334  1 3253 1           TCF    JOBSLP2     AND TO EJSCAN.
```

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P0252 .RELEASE THIS CORE SET AND VAC AREA AND SCAN FOR THE JOB OF HIGHEST ACTIVE PRIORITY.

```
0254                                01,3335  0 0004 0  ENDJOB1  INHINT
0255  REF 300 LAST1057             01,3336  4 7767 1            CS      ZERO
0256  REF 136 LAST1057             01,3337  54 121 1            TS      BUF +1
0257  REF  19 LAST1057             01,3340  56 157 1            XCH     PRIORITY
0258  REF   8 LAST1057             01,3341  7 5341 0            MASK    LOW9
0259  REF 360 LAST1051             01,3342  10 000 0            CCS     A
0260  REF 361 LAST1058             01,3343  50 000 1            INDEX   A
0261                                01,3344  54 000 0            TS      0

0262  REF  20 LAST1058             01,3345  10 173 0  EJSCAN    CCS     PRIORITY +12D
0263  REF   1                      01,3346  0 3412 0            TC      EJ1
0264  REF  54 LAST1052             01,3347  0 4736 1            TC      CCSHOLE
0265                                01,3350  1 3351 1            TCF     +1

0266  REF  21 LAST1058             01,3351  10 207 0            CCS     PRIORITY +24D   EXAMINE EACH PRIORITY REGISTER TO FIND
0267  REF   2 LAST1058             01,3352  0 3412 0            TC      EJ1             THE JOB OF HIGHEST ACTIVE PRIORITY.
0268  REF  55 LAST1058             01,3353  0 4736 1            TC      CCSHOLE
0269                                01,3354  1 3355 0            TCF     +1

0270  REF  22 LAST1058             01,3355  10 223 0            CCS     PRIORITY +36D
0271  REF   3 LAST1058             01,3356  0 3412 0            TC      EJ1
0272  REF  23 LAST1058             01,3357  67 620 1  -CCSPR    -CCS    PRIORITY
0273                                01,3360  1 3361 1            TCF     +1

0274  REF  24 LAST1058             01,3361  10 237 0            CCS     PRIORITY +48D
0275  REF   4 LAST1058             01,3362  0 3412 0            TC      EJ1
0276  REF  56 LAST1058             01,3363  0 4736 1            TC      CCSHOLE
0277                                01,3364  1 3365 0            TCF     +1

0278  REF  25 LAST1058             01,3365  10 253 1            CCS     PRIORITY +60D
0279  REF   5 LAST1058             01,3366  0 3412 0            TC      EJ1
0280  REF  57 LAST1058             01,3367  0 4736 1            TC      CCSHOLE
0281                                01,3370  1 3371 0            TCF     +1

0282  REF  26 LAST1058             01,3371  10 267 0            CCS     PRIORITY +72D
0283  REF   6 LAST1058             01,3372  0 3412 0            TC      EJ1
0284  REF  58 LAST1058             01,3373  0 4736 1            TC      CCSHOLE
0285                                01,3374  1 3375 1            TCF     +1
```

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P0286 EVALUATE THE RESULTS OF THE SCAN.

```
0287  REF 137 LAST1058   01,3375  10 121 1        CCS   BUF +1      SEE IF THERE ARE ANY ACTIVE JOBS WAITING
0288  REF  59 LAST1058   01,3376  0 4736 1        TC    CCSHOLE
0289  REF  60 LAST1059   01,3377  0 4736 1        TC    CCSHOLE

0290                     01,3400  1 3402 0        TCF   +2
0291  REF   4 LAST  90   01,3401  1 5576 1        TCF   DUMMYJOB
0292  REF 138 LAST1059   01,3402  10 120 0        CCS   BUF           BUF IS ZERO IF THIS IS A PRIOCHNG AND
0293                     01,3403  1 3405 1        TCF   +2            CHANGED PRIORITY IS STILL HIGHEST.
0294  REF   2 LAST1053   01,3404  1 3233 1        TCF   ENDPRCHG

0295  REF 362 LAST1058   01,3405  50 000 1        INDEX A             OTHERWISE, SET NEWJOB TO THE RELATIVE
0296                     01,3406  2'7777 0        CAF   0 -1          ADDRESS OF THE NEW JOB'S CORE SET.
0297  REF   1            01,3407  6 3357 0        AD    -CCSPR
0298  REF  22 LAST1053   01,3410  54 067 1        IS    NEWJOB
0299  REF   2 LAST1049   01,3411  1 3162 0        TCF   CHANJOB -1

0300  REF 139 LAST1059   01,3412  54 122 1  EJ1   IS    BUF +2
0301  REF 140 LAST1059   01,3413  6 0121 0        AD    BUF +1        = OLD HIGH PRIORITY.
0302  REF 363 LAST1059   01,3414  10 000 0        CCS   A
0303  REF 141 LAST1059   01,3415  4 0122 1        CS    BUF +2
0304  REF   1            01,3416  1 3422 1        TCF   EJ2           NEW HIGH PRIORITY.
0305                     01,3417  1 3420 0        NOOP
0306  REF 324 LAST1050   01,3420  50 002 0        INDEX Q
0307                     01,3421  0 0002 0        TC    2             PROCEED WITH SEARCH.

0308  REF 142 LAST1059   01,3422  54 121 1  EJ2   IS    BUF +1
0309                     01,3423  0 0006 1        EXTEND
0310  REF 143 LAST1059   01,3424  22 120 1        QXCH  BUF           FOR LOCATING CCS PRIORITY + X INSTR.
0311  REF 144 LAST1059   01,3425  50 120 1        INDEX BUF
0312                     01,3426  0 0002 0        TC    2
```

P0314 IDLING AND COMPUTER ACTIVITY (GREEN) LIGHT MAINTENANCE. THE IDLING ROUTINE IS NOT A JOB IN ITSELF,
R0316 BUT RATHER A SUBROUTINE OF THE EXECUTIVE.

```
0317                                    5576            BLOCK   02
0318    REF   2 LAST  98                  E2            EBANK=  SELFRET         SELF-CHECK STORAGE IN EBANK.

0319    REF 301 LAST1058        5576  4 7767 1  DUMMYJOB CS      ZERO            SET NEWJOB TO -0 FOR IDLING.
0320    REF  23 LAST1059        5577  54 067 1          TS      NEWJOB
0321                            5600  0 0003 1          RELINT
0322    REF 106 LAST1051        5601  4 7762 1          CS      TWO             TURN OFF THE ACTIVITY LIGHT.
0323                            5602  0 0006 1          EXTEND
0324    REF  18 LAST 497        5603  03 011 1          WAND    DSALMOUT
0325    REF   1                 5604  1 5607 1          ICF     CHECKNJ +2

0326                            5605  0 0006 1  CHECKNJ  EXTEND                  SPECIAL NEWJOB TEST FOR SELF-CHECK,
0327    REF   3 LAST1060        5606  23'354 1          DXCH    SELFRET         WHICH RUNS UNDER EXECUTIVE CONTROL,
0328    REF  24 LAST1060        5607  10 067 1   +2     CCS     NEWJOB          BUT DOES NOT HAVE A JOBS CORE REGISTERS.
0329    REF   1                 5610  1 5622 0          ICF     NUCHANGE        NEW JOB REQUIRING A CHANGE JOB.
0330    REF 107 LAST1060        5611  3 7762 0          CAF     TWO             NEW JOB ALREADY IN POSITION FOR
0331    REF   1                 5612  1 5616 1          ICF     NODIRECT        EXECUTION.

0332    REF   1                 5613  3 5631 0  ADVAN   CAF     SELFBANK        (SIMULATOR ADVAN IF NEWJOB = 77777).
0333    REF  28 LAST1055        5614  54 006 0          TS      BBANK
0334    REF   4 LAST1060        5615  0 1354 1          IC      SELFRET

0335                            5616  0 0006 1  NODIRECT EXTEND                  TURN THE GREEN LIGHT BACK ON.
0336    REF  19 LAST1060        5617  05 011 1          WOR     DSALMOUT
0337    REF  42 LAST1057        5620  52 155 1          DXCH    LOC             JOBS STARTED IN THIS FASHION MUST BE
0338                            5621  52 006 0          DTCB                    BASIC.

0339    REF 108 LAST1060        5622  3 7762 0  NUCHANGE CAF     TWO
0340                            5623  0 0006 1          EXTEND
0341    REF  20 LAST1060        5624  05 011 1          WOR     DSALMOUT
0342    REF   9 LAST1050        5625  3 5575 0          CAF     EXECBANK        SWAP CORE SETS.
0343    REF  31 LAST1050        5626  54 004 1          TS      FBANK
0344                            5627  0 0004 0          INHINT                  CHANGE JOBS
0345    REF   3 LAST1059        5630  1 3162 0          ICF     CHANJOB -1

03455   REF   5 LAST1060          E2                    EBANK=  SELFRET
0346    REF   2 LAST  99        5631   76062 1  SELFBANK BBCON  SELFCHK
```

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P0347 PRIORITY CONSTANTS (NOTE IN FIXED-FIXED).

```
0348   REF  48 LAST1007                7752  PRIO1    EQUALS BIT10
0349   REF  42 LAST1047                7751  PRIO2    EQUALS BIT11
0350                          5632  03000 1  PRIO3    OCT    03000
0351   REF  29 LAST1047                7750  PRIO4    EQUALS BIT12
0352                          5633  05000 1  PRIO5    OCT    05000
0353                          5634  06000 1  PRIO6    OCT    06000
0354                          5635  07000 0  PRIO7    OCT    07000
0355   REF  31 LAST1045                7747  PRIO10   EQUALS BIT13
0356                          5636  11000 1  PRIO11   OCT    11000
0357   REF   1                         5234  PRIO12   =      BNKJUP+4
0358                          5637  13000 0  PRIO13   OCT    13000
0359                          5640  14000 1  PRIO14   OCT    14000
0360                          5641  15000 0  PRIO15   OCT    15000
0361                          5642  16000 0  PRIO16   OCT    16000
0362                          5643  17000 1  PRIO17   OCT    17000
0363   REF  57 LAST1036                7746  PRIO20   EQUALS BIT14
0364                          5644  21000 1  PRIO21   OCT    21000
0365                          5645  22000 1  PRIO22   OCT    22000
0366                          5646  23000 0  PRIO23   OCT    23000
0367   REF   1                         4260  PRIO24   =      NUFAZ+10
0368                          5647  25000 0  PRIO25   OCT    25000
0369                          5650  26000 0  PRIO26   OCT    26000
0370                          5651  27000 1  PRIO27   OCT    27000
0371   REF   1                         5210  PRIO30   =      BNKCAL+2
0372                          5652  31000 0  PRIO31   OCT    31000
0373                          5653  32000 0  PRIO32   OCT    32000
0374                          5654  33000 1  PRIO33   OCT    33000
0375                          5655  34000 0  PRIO34   OCT    34000
0376                          5656  35000 1  PRIO35   OCT    35000
0377                          5657  36000 1  PRIO36   OCT    36000
0378                          5660  37000 0  PRIO37   OCT    37000

R0379  EBANK CONSTANTS IN FIXED-FIXED

0380   REF   9 LAST1040                5352  EBANK3   EQUALS OCT1400
0381   REF  43 LAST1061                7751  EBANK4   EQUALS BIT11
0382                          5661  02400 1  EBANK5   OCTAL  02400
0383   REF   4 LAST 838                5632  EBANK6   EQUALS PRIO3
0384                          5662  03400 0  EBANK7   OCTAL  03400
```

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```
R000001 PROGRAM DESCRIPTION                                          DATE = 10 OCTOBER 1966
R000003 MOD NO = 2                                                   LOG SECTION = WAITLIST
R000005 MOD BY = MILLER   (DTMAX INCREASED TO 162.5 SEC)             ASSEMBLY SUNBURST REV 5
R000007

R000008 FUNCTIONAL DESCRIPTION-
R000009       PART OF A SECTION OF PROGRAMS,-WAITLIST, TASKOVER, T3RUPT, USED  TO CALL A PROGRAM, (CALLED A TASK),
R000011    WHICH IS TO BEGIN IN C(A) CENTISECONDS.  WAITLIST UPDATES TIME3, LST1 AND LST2. THE MEANING OF THESE LISTS
R000013    FOLLOW.

R000014              C(TIME3)  = 16384 -(T1-T) CENTISECONDS, (T=PRESENT TIME, T1=TIME FOR TASK1)
R000016

R000017                              C(LST1)     = -(T2-T1)+1
R000018                              C(LST1 +1)  = -(T3-T2)+1
R000019                              C(LST1 +2)  = -(T4-T3)+1
R00002                                           .
R000021                                          .
R000022                              C(LST1 +6)  = -(T8-T7)+1
R000023                              C(LST1 +7)  = -(T9-T8)+1

R000024                              C(LST2)     = 2CADR OF TASK1
R000025                              C(LST2 +2)  = 2CADR OF TASK2
R000026                                          .
R000027                                          .
R000028                              C(LST2 +14)= 2CADR OF TASK8
R000029                              C(LST2 +16)= 2CADR OF TASK9

R00003  WARNINGS-
R000031 -_------
R000032            1) 1 <= C(A) <= 16250D (1 CENTISECOND TO 162.5 SEC)
R000033            2) 9 TASKS MAXIMUM
R000034            3) TASKS CALLED UNDER INTERRUPT INHIBITED
R000035            4) TASKS END BY TC TASKOVER

R000036 CALLING SEQUENCE-

R000037            L-2    CAF    DELTAT   (TIME IN CENTISECONDS TO TASK START)
R000038            L-1    INHINT
R000039            L      TC     WAITLIST
R00004             L+1    2CADR  DESIRED TASK
R000041            L+2    (MINOR OF 2CADR)
R000042            L+3    RELINT          (RETURNS HERE)

R000043 NORMAL EXIT MODES-

R000044            AT L+3 OF CALLING SEQUENCE

R000045 ALARM OR ABORT EXIT MODES-
```

```
R000046             TC     ABORT
R000047             OCT    1203    (WAITLIST OVERFLOW - TOO MANY TASKS)

R000048 ERASABLE INITIALIZATION REQUIRED-

R000049             ACCOMPLISHED BY FRESH START.--LST2.... LST2 +16 =ENDTASK
R00005                                       LST1.... LST1 +7  =NEG1/2

R000051 OUTPUT--

R000052             LST1 AND LST2 UPDATED WITH NEW TASK AND ASSOCIATED TIME.
R000053 DEBRIS-

R000054             CENTRALS- A,Q,L
R000055             OTHER   - WAITEXIT, WAITADR, WAITTEMP, WAITBANK
R000056 DETAILED ANALYSIS OF TIMING-

R000057       CONTROL WILL NOT BE RETURNED TO THE SPECIFIED ADDRESS (2CADR)   IN EXACTLY DELTA T CENTISECONDS.
R000059    THE APPROXIMATE TIME MAY BE CALCULATED AS FOLLOWS

R00006              LET TO = THE TIME OF THE TC WAITLIST
R000061             LET TS = TO +1470 + COUNTER INCREMENTS (SET UP TIME)
R000062             LET X  = TS -(100TS)/100  (VARIANCE FROM COUNTERS)
R000063             LET Y  = LENGTH OF TIME OF INHIBIT INTERRUPT AFTER T3RUPT
R000064             LET Z  = LENGTH OF TIME TO PROCESS TASKS WHICH ARE DUE THIS T3RUPT BUT DISPATCHED EARLIER.
R000066    (Z=0, USUALLY)
R000067               LET DELTD = THE ACTUAL TIME TAKEN TO GIVE CONTROL TO 2CADR
R000068            THEN   DELTD = TS+DELTA T -X +Y +Z +1.05MS* +COUNTERS*
R000069    *-THE TIME TAKEN BY WAITLIST ITSELF AND THE COUNTER TICKING DURING THIS WAITLIST TIME.
R000071

R000072       IN SHORT, THE ACTUAL TIME TO RETURN CONTROL TO A 2CADR IS AUGMENTED BY THE TIME TO SET UP THE TASK;S
R000074    INTERRUPT, ALL COUNTERS TICKING, THE T3RUPT PROCESSING TIME, THE WAITLIST PROCESSING TIME AND THE POSSIBILITY
R000076    OF OTHER TASKS INHIBITING THE INTERRUPT.


 0002                                  5663          BLOCK  02
 0003   REF  34 LAST 814                E3            EBANK= LST1          TASK  LISTS IN SWITCHED E BANK.

 0004   REF 325 LAST1059        5663  56 002 0  WAITLIST XCH    Q             SAVE DELTA T IN Q AND RETURN IN
 0005   REF   1                 5664  54 061 1          TS     WAITEXIT      WAITEXIT.
 0006                           5665  0 0006 1          EXTEND
 0007   REF 364 LAST1059        5666  5 0000 1          INDEX  A
 0008                           5667  3 0001 0          DCA    0             PICK UP 2CADR OF TASK.
 0009   REF   1                 5670  54 063 0          TS     WAITADR       BBCON WILL REMAIN IN L.
 0010   REF   1                 5671  3 5700 0  DLY2    CAF    WAITBB        ENTRY FROM FIXDELAY AND VARDELAY.
 0011   REF  29 LAST1060        5672  56 006 1          XCH    BBANK
 0012   REF   1                 5673  1 3427 1          TCF    WAIT2

R0013          RETURN TO CALLER AFTER TASK INSERTION:
```

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```
0014  REF   1                5674  3 0062 0  LVWTLIST CA     WAITBANK
0015  REF  30 LAST1063        5675  54 006 0            TS     BBANK
0016  REF   2 LAST1063        5676  50 061 0            INDEX  WAITEXIT
0017                          5677  0 0002 0            TC     2

00175 REF  35 LAST1063                 E3               EBANK= LST1
0018  REF   2 LAST1063        5700   02063 0  WAITBB    BBCON  WAIT2

R0019          RETURN TO CALLER +2 AFTER WAITING DT SPECIFIED AT CALLER +1.

0020  REF 326 LAST1063        5701  50 002 0  FIXDELAY INDEX  Q          BOTH ROUTINES MUST BE CALLED UNDER
0021                          5702  3 0000 1            CAF    0          WAITLIST CONTROL AND TERMINATE THE TASK
0022  REF 327 LAST1064        5703  24 002 0            INCR   Q          IN WHICH THEY WERE CALLED.

R0023          RETURN TO CALLER +1 AFTER WAITING THE DT AS ARRIVING IN A.

0024  REF 328 LAST1064        5704  56 002 0  VARDELAY XCH    Q          DT TO Q. TASK ADRES TO WAITADR.
0025  REF   2 LAST1063        5705  54 063 0            TS     WAITADR
0026  REF  31 LAST1064        5706  3 0006 1            CA     BBANK      BBANK IS SAVED DURING DELAY.
0027  REF 186 LAST1049        5707  54 001 1            TS     L
0028  REF   1                 5710  3 5713 1            CAF    DELAYEX
0029  REF   3 LAST1064        5711  54 061 1            TS     WAITEXIT   GO TO TASKOVER AFTER TASK ENTRY.
0030  REF   1                 5712  1 5671 0            TCF    DLY2

0031  REF 120 LAST 922        5713  1 5725 0  DELAYEX  TCF    TASKOVER -2  RETURNS TO TASKOVER
```

L WAITLIST USER'S OWN PAGE NO. 4 S3 E3

R0032 ENDTASK MUST BE ENTERED IN FIXED-FIXED SO IT IS DISTINGUISHABLE BY ITS ADRES ALONE.

```
 00335  REF  36 LAST1064                        E3          EBANK= LST1
 0034                              5714   72061 0  ENDTASK -2CADR  SVCT3
C0034   REF   3 LAST 303           5715   73714 1
 0035   REF  31 LAST 866           5716  10 076 1  SVCT3    CCS     FLAGWRD2      DRIFT FLAG
 00351  REF 121 LAST1064           5717   1 5727 1           TCF     TASKOVER
 00352  REF 122 LAST1065           5720   1 5727 1           TCF     TASKOVER
 00353                              5721   1 5722 1           ICF     +1

 00354  REF   4 LAST 863           5722   3 5656 1           CAF     PRIO35        COMPENSATE FOR NBD COEFFICIENTS ONLY
 00355  REF  34 LAST 863           5723   0 5505 1           TC      NOVAC             ENABLE EVERY 81.93 SECONDS
 003555 REF   7 LAST 866                        E3          EBANK= NBDX
 00356                              5724   03501 0           2CADR   NBDONLY
C00356  REF   1                    5725   24063 1
 00357  REF 123 LAST1065           5726   1 5727 1           TCF     TASKOVER
```

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```
P0036           BEGIN TASK INSERTION.

 0037                                  01,3427
 0038   REF   2 LAST1064      01,3427  54 062 1  WAIT2   IS      WAITBANK        BBANK OF CALLING PROGRAM.
 0039   REF   3 LAST 408      01,3430  4 0026 1          CS      TIME3
 0040   REF  35 LAST1005      01,3431  6 7754 0          AD      BIT8            BIT 8 = OCT 200
 0041   REF 365 LAST1063      01,3432  10 000 0          CCS     A               TEST 200 - C(TIME3).  IF POSITIVE,
A0042                                          IT MEANS THAT TIME3 OVERFLOW HAS OCCURRED PRIOR TO CS  TIME3 AND THAT
A0043                                          C(TIME3) = 1 - T1, INSTEAD OF 1.0 - (T1 - T).  THE FOLLOWING FOUR
A0044                                          ORDERS SET C(A) = TD - T1 + 1 IN EITHER CASE.

 0045   REF   3 LAST 998      01,3433  6 6153 0          AD      OCT40001        OVERFLOW HAS OCCURRED.  SET C(A) =
 0046   REF 366 LAST1066      01,3434  4 0000 0          CS      A               T - T1 + 1.0 - 201

R0047   NORMAL CASE (C(A) NNZ) YIELDS SAME C(A):  -( -(1.0-(T1-T)) + 200) = 1

 0048   REF   1               01,3435  6 3563 1          AD      OCT40201
 0049   REF 329 LAST1064      01,3436  6 0002 0          AD      Q               RESULT = TD - T1 + 1.

 0050   REF 367 LAST1066      01,3437  10 000 0          CCS     A               TEST TD - T1 + 1

 0051   REF  37 LAST1065      01,3440  6 1400 1          AD      LST1            IF TD - T1 POS, GO TO WTLST5 WITH
 0052   REF   1               01,3441  1 3503 0          TCF     WTLST5          C(A) = (TD - T1) + C(LST1) = TD-T2+1

 0053                         01,3442  1 3443 0          NOOP
 0054   REF 330 LAST1066      01,3443  4 0002 1          CS      Q

R0055   NOTE THAT THIS PROGRAM SECTION IS NEVER ENTERED WHEN T-T1 G/E -1,
R0056   SINCE TD-T1+1 = (TD-T) + (T-T1+1), AND DELTA T = TD-T G/E +1 .  (G/E
R0057   SYMBOL MEANS GREATER THAN OR EQUAL TO).  THUS THERE NEED BE NO CON-
R0058   CERN OVER A PREVIOUS OR IMMINENT OVERFLOW OF TIME3 HERE.

 0059   REF   1               01,3444  6 7746 0          AD      POS1/2          WHEN TD IS NEXT, FORM QUANTITY
 0060   REF   2 LAST1066      01,3445  6 7746 0          AD      POS1/2            1.0 - DELTA T = 1.0 - (TD - T)
 0061   REF   4 LAST1066      01,3446  56 026 0          XCH     TIME3
 0062   REF  16 LAST 670      01,3447  6 7745 0          AD      NEGMAX
 0063   REF 331 LAST1066      01,3450  6 0002 0          AD      Q               1.0 - DELTAT T NOW COMPLETE.
 0064                         01,3451  0 0006 1          EXTEND                  ZERO INDEX G.
 0065                         01,3452  22 007 0          QXCH    7               (ZQ)
```

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```
0066  REF  38 LAST1066   01,3453  57'400 1  WTLST4  XCH   LST1
0067  REF  39 LAST1067   01,3454  57'401 0          XCH   LST1 +1
0068  REF  40 LAST1067   01,3455  57'402 0          XCH   LST1 +2
0069  REF  41 LAST1067   01,3456  57'403 1          XCH   LST1 +3
0070  REF  42 LAST1067   01,3457  57'404 0          XCH   LST1 +4
0071  REF  43 LAST1067   01,3460  57'405 1          XCH   LST1 +5
0072  REF  44 LAST1067   01,3461  57'406 1          XCH   LST1 +6
0073  REF  45 LAST1067   01,3462  57'407 0          XCH   LST1 +7

0074  REF   3 LAST1064   01,3463  3 0063 1          CA    WAITADR     (MINOR PART OF TASK CADR HAS BEEN IN L.)
0075  REF 332 LAST1066   01,3464  50 002 0          INDEX Q
0076                     01,3465  1 3466 1          TCF   +1

0077  REF  19 LAST  97   01,3466  53'411 0          DXCH  LST2
0078  REF  20 LAST1067   01,3467  53'413 1          DXCH  LST2 +2
0079  REF  21 LAST1067   01,3470  53'415 1          DXCH  LST2 +4
0080  REF  22 LAST1067   01,3471  53'417 0          DXCH  LST2 +6
0081  REF  23 LAST1067   01,3472  53'421 0          DXCH  LST2 +8D
0082  REF  24 LAST1067   01,3473  53'423 1          DXCH  LST2 +10D     AT END, CHECK THAT C(LST2+10) IS STD
0083  REF  25 LAST1067   01,3474  53'425 1          DXCH  LST2 +12D
0084  REF  26 LAST1067   01,3475  53'427 0          DXCH  LST2 +14D
0085  REF  27 LAST1067   01,3476  53'431 1          DXCH  LST2 +16D
0086  REF   3 LAST  97   01,3477  6 5714 0          AD    ENDTASK       END ITEM, AS CHECK FOR EXCEEDING
A0087                                                                    THE LENGTH OF THE LIST.
0088                     01,3500  0 0006 1          EXTEND              DUMMY TASK ADRES SHOULD BE IN FIXED-
0089  REF   1           01,3501  1 5674 0          BZF   LVWTLIST      FIXED SO ITS ADRES ALONE DISTINGUISHES
0090  REF   1           01,3502  1 3556 0          TCF   WTABORT       IT.
```

L WAITLIST USER'S OWN PAGE NO. 7 53 E3

```
0091  REF 368 LAST1066   01,3503  10 000 0  WTLST5  CCS   A          TEST  TD - T2 + 1
0092  REF  46 LAST1067   01,3504  6 1401 0          AD    LST1 +1
0093                     01,3505  1 3511 0          TCF   +4
0094  REF 176 LAST1056   01,3506  6 7763 1          AD    ONE
0095  REF   1            01,3507  0 3564 0          TC    WTLST2
0096                     01,3510   00001 0          UCI   1

0097  REF 369 LAST1068   01,3511  10 000 0  +4      CCS   A          TEST  TD - T3 + 1
0098  REF  47 LAST1068   01,3512  6 1402 0          AD    LST1 +2
0099                     01,3513  1 3517 0          TCF   +4
0100  REF 177 LAST1068   01,3514  6 7763 1          AD    ONE
0101  REF   2 LAST1068   01,3515  0 3564 0          TC    WTLST2
0102                     01,3516   00002 0          UCI   2

0103  REF 370 LAST1068   01,3517  10 000 0  +4      CCS   A          TEST  TD - T4 + 1
0104  REF  48 LAST1068   01,3520  6 1403 1          AD    LST1 +3
0105                     01,3521  1 3525 1          TCF   +4
0106  REF 178 LAST1068   01,3522  6 7763 1          AD    ONE
0107  REF   3 LAST1068   01,3523  0 3564 0          TC    WTLST2
0108                     01,3524   00003 1          UCI   3

0109  REF 371 LAST1068   01,3525  10 000 0  +4      CCS   A          TEST  TD - T5 + 1
0110  REF  49 LAST1068   01,3526  6 1404 0          AD    LST1 +4
0111                     01,3527  1 3533 0          TCF   +4
0112  REF 179 LAST1068   01,3530  6 7763 1          AD    ONE
0113  REF   4 LAST1068   01,3531  0 3564 0          TC    WTLST2
0114                     01,3532   00004 0          UCI   4

0115  REF 372 LAST1068   01,3533  10 000 0  +4      CCS   A          TEST  TD - T6 + 1
0116  REF  50 LAST1068   01,3534  6 1405 1          AD    LST1 +5
0117                     01,3535  1 3541 0          TCF   +4
0118  REF 180 LAST1068   01,3536  6 7763 1          AD    ONE
0119  REF   5 LAST1068   01,3537  0 3564 0          TC    WTLST2
0120                     01,3540   00005 1          UCI   5

0121  REF 373 LAST1068   01,3541  10 000 0  +4      CCS   A          TEST  TD - T7 + 1
0122  REF  51 LAST1068   01,3542  6 1406 1          AD    LST1 +6
0123                     01,3543  1 3547 0          TCF   +4
0124  REF 181 LAST1068   01,3544  6 7763 1          AD    ONE
0125  REF   6 LAST1068   01,3545  0 3564 0          TC    WTLST2
0126                     01,3546   00006 1          UCI   6
```

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```
0127   REF 374 LAST1068     01,3547  10 000 0   +4        CCS    A
0128   REF  52 LAST1068     01,3550  6 1407 0             AD     LST1 +7
0129                        01,3551  1 3555 0             ICF    +4
0130   REF 182 LAST1068     01,3552  6 7763 1             AD     ONE
0131   REF   7 LAST1068     01,3553  0 3564 0             TC     WTLST2
0132                        01,3554   00007 0             UCI    7

0133   REF 375 LAST1069     01,3555  10 000 0   +4        CCS    A
0134   REF  10 LAST1052     01,3556  0 6000 1   WTABORT   TC     ABORT        NO ROOM IN THE INN.
0135                        01,3557   01203 1             UCI    1203

0136   REF 183 LAST1069     01,3560  6 7763 1             AD     ONE
0137   REF   8 LAST1069     01,3561  0 3564 0             TC     WTLST2
0138                        01,3562   00010 0             UCI    10

0139                        01,3563   40201 0   OCT40201  UCI    40201
```

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```
P0140   THE ENTRY TO WTLST2 JUST PRECEDING OCT  N  IS FOR T   LE TD LE T    -1.
R0141                                                    N          N+1

R0142   (LE MEANS LESS THAN OR EQUAL TO).  AT ENTRY, C(A) = -(TD - T     + 1)
R0143                                                             N+1

R0144   THE LST1 ENTRY -(T    - T +1) IS TO BE REPLACED BY -(TD - T + 1), AND
R0145                  N+1   N                                    N

R0146   THE ENTRY -(T    - TD + 1) IS TO BE INSERTED IMMEDIATELY FOLLOWING.
R0147              N+1

 0148   REF   1              01,3564  54 064 1  WTLST2   IS     WAITTEMP          C(A) = -(TD - T    + 1)
 0149   REF 333 LAST1067     01,3565  50 002 0           INDEX  Q
 0150                        01,3566  3 0000 1           CAF    0
 0151   REF 334 LAST1070     01,3567  54 002 1           IS     Q                 INDEX VALUE INTO Q.

 0152   REF 184 LAST1069     01,3570  3 7763 1           CAF    ONE
 0153   REF   2 LAST1070     01,3571  6 0064 0           AD     WAITTEMP
 0154   REF 335 LAST1070     01,3572  50 002 0           INDEX  Q                 C(A) = -(TD - T ) + 1.
 0155   REF  53 LAST1069     01,3573  27'377 1           ADS    LST1 -1                            N

 0156   REF   3 LAST1070     01,3574  4 0064 1           CS     WAITTEMP
 0157   REF 336 LAST1070     01,3575  50 002 0           INDEX  Q
 0158   REF   1              01,3576  1 3453 1           TCF    WTLST4

R0159   C(TIME3) = 1.0 - (T1 - T)

R0160   C(LST1   ) = - (T2 - T1) + 1
R0161   C(LST1+1) = - (T3 - T2) + 1
R0162   C(LST1+2) = - (T4 - T3) + 1
R0163   C(LST1+3) = - (T5 - T4) + 1
R0164   C(LST1+4) = - (T6 - T5) + 1

R0165   C(LST2   ) = 2CADR  TASK1
R0166   C(LST2+2 ) = 2CADR  TASK2
R0167   C(LST2+4 ) = 2CADR  TASK3
R0168   C(LST2+6 ) = 2CADR  TASK4
R0169   C(LST2+8 ) = 2CADR  TASK5
R0170   C(LST2+10) = 2CADR  TASK6
```

L WAITLIST USER'S OWN PAGE NO. 10 S3 E3

P0171 ENTERS HERE ON T3 RUPT TO DISPATCH WAITLISTED TASK.

```
0172  REF  21 LAST 633     01,3577  54 016 1  T3RUPT   IS      BANKRUPT
0173                       01,3600  0 0006 1           EXTEND
0174  REF  19 LAST 633     01,3601  22 012 1           QXCH    QRUPT

0175  REF  10 LAST1032     01,3602  3 7744 1  T3RUPT2  CAF     NEG1/2        DISPATCH WAITLIST TASK.
0176  REF  54 LAST1070     01,3603  57'407 0           XCH     LST1 +7
0177  REF  55 LAST1071     01,3604  57'406 1           XCH     LST1 +6
0178  REF  56 LAST1071     01,3605  57'405 1           XCH     LST1 +5
0179  REF  57 LAST1071     01,3606  57'404 0           XCH     LST1 +4       1.  MOVE UP LST1 CONTENTS, ENTERING
0180  REF  58 LAST1071     01,3607  57'403 1           XCH     LST1 +3           A VALUE OF 1/2 +1 AT THE BOTTOM
0181  REF  59 LAST1071     01,3610  57'402 0           XCH     LST1 +2           FOR T6-T5, CORRESPONDING TO THE
0182  REF  60 LAST1071     01,3611  57'401 0           XCH     LST1 +1           INTERVAL 81.91 SEC FOR ENDTASK.
0183  REF  61 LAST1071     01,3612  57'400 1           XCH     LST1
0184  REF  61 LAST1030     01,3613  6 7743 0           AD      POSMAX        2.  SET T3 = 1.0 - T2 -T USING LIST 1.
0185  REF   5 LAST1066     01,3614  26 026 1           ADS     TIME3         SO T3 WONT TICK DURING UPDATE.
0186  REF   4 LAST 197     01,3615  55'076 0           IS      RUPTAGN
0187  REF 302 LAST1060     01,3616  4 7767 1           CS      ZERO
0188  REF   5 LAST1071     01,3617  55'076 0           IS      RUPTAGN       SETS RUPTAGN TO +1 ON OVERFLOW.

0189                       01,3620  0 0006 1           EXTEND                DISPATCH TASK.
0190  REF   4 LAST1067     01,3621  4 5715 0           DCS     ENDTASK
0191  REF  28 LAST1067     01,3622  53'431 1           DXCH    LST2 +16D
0192  REF  29 LAST1071     01,3623  53'427 0           DXCH    LST2 +14D
0193  REF  30 LAST1071     01,3624  53'425 1           DXCH    LST2 +12D
0194  REF  31 LAST1071     01,3625  53'423 1           DXCH    LST2 +10D
0195  REF  32 LAST1071     01,3626  53'421 0           DXCH    LST2 +8D
0196  REF  33 LAST1071     01,3627  53'417 0           DXCH    LST2 +6
0197  REF  34 LAST1071     01,3630  53'415 1           DXCH    LST2 +4
0198  REF  35 LAST1071     01,3631  53'413 1           DXCH    LST2 +2
0199  REF  36 LAST1071     01,3632  53'411 0           DXCH    LST2

0200                       01,3633  52 006 0           DTCB
```

L WAITLIST USER'S OWN PAGE NO. 11 S3 E3

P0202 RETURN, AFTER EXECUTION OF T3 OVERFLOW TASK:

```
0203                                    5727            BLOCK   02
0204   REF   6 LAST1071        5727  11'076 0  TASKOVER CCS     RUPTAGN     IF +1 RETURN TO T3RUPT, IF -0 RESUME.
0205   REF   2 LAST1063        5730  3 5700 0           CAF     WAITBB
0206   REF  32 LAST1064        5731  54 006 0           TS      BBANK
0207   REF   1                 5732  1 3602 1           TCF     T3RUPT2     DISPATCH NEXT TASK IF IT WAS DUE.

0208                            5733  0 0006 1  RESUME   EXTEND
0209   REF  20 LAST1071        5734  22 012 1           DXCH    QRUPT
0210   REF  22 LAST1071        5735  3 0016 0  NOQRSM   CA      BANKRUPT
0211   REF  33 LAST1072        5736  56 006 1           XCH     BBANK
0212   REF  11 LAST  61        5737  52 011 0  NOQBRSM  DXCH    ARUPT
0213                            5740  50 017 1           RESUME
```

```
L       WAITLIST                                                USER'S OWN PAGE NO.  12          53  E3

P1000   LONGCALL

R1001   LONGCALL IS CALLED WITH THE DELTA TIME ARRIVING IN A,L SCALED AS TIME2,TIME1 WITH THE 2CADR OF THE TASK
R1003   IMMEDIATELY FOLLOWING THE TC LONGCALL.  FOR EXAMPLE, IT MIGHT BE DONE AS FOLLOWS WHERE TIMELOC IS THE NAME OF
R1005   A DP REGISTER CONTAINING A DELTA TIME AND WHERE TASKTODO IS THE NAME OF THE LOCATION AT WHICH LONGCALL IS TO
R1007   START

A1008                                                   EXTEND
A1009                                                   DCA     TIMELOC
A1010                                                   TC      LONGCALL
A1011                                                   2CADR   TASKTODO

R1012   *** THE FOLLOWING IS TO BE IN FIXED-FIXED AND UNSWITCHED ERRASIBLE ***

 1013                                    5741           BLOCK   02
 1014   REF  62 LAST1071                  E3            EBANK=  LST1
 1015   REF   7 LAST  75        5741  53'154 1  LONGCALL DXCH    LONGTIME        OBTAIN THE DELTA TIME

 1016                           5742   0 0006 1          EXTEND                  OBTAIN THE 2CADR
 1017   REF 337 LAST1070        5743   5 0002 0          NDX     Q
 1018                           5744   3 0001 0          DCA     0
 1019   REF   1                 5745  53'152 1          DXCH    LONGCADR

 1020                           5746   0 0006 1          EXTEND                  NOW GO TO THE APPROPRIATE SWITCHED BANK
 1021   REF   1                 5747   3 5752 1          DCA     LGCL2CDR        FOR THE REST OF LONGCALL
 1022                           5750   52 006 0          DTCB

 10225  REF  63 LAST1073                  E3            EBANK=  LST1
 1023                           5751    03634 0  LGCL2CDR 2CADR   LNGCALL2
C1023   REF   1                 5752    02063 0
R1024   *** THE FOLLOWING MAY BE IN A SWITCHED BANK, INCLUDING ITS ERASABLE ***

 1025                                    01,3634           BANK    01
 1026   REF   1          01,3634  23'435 1  LNGCALL2 LXCH    LONGEXIT +1     SAVE THE CORRECT BB FOR RETURN
 1027   REF 109 LAST1060 01,3635  3 7762 0           CA      TWO             OBTAIN THE RETURN ADDRESS
 1028   REF 338 LAST1073 01,3636  26 002 1           ADS     Q
 1029   REF   2 LAST1073 01,3637  55'434 1           TS      LONGEXIT

R10291          *** WAITLIST TASK LONGCYCL ***
 1030                     01,3640  0 0006 1  LONGCYCL EXTEND                  CAN WE SUCCESFULLY TAKE ABOUT 1.25
 1031   REF   1           01,3641  4 3652 1          DCS     DPBIT14         MINUTES OFF OF LONGTIME
 1032   REF   8 LAST1073  01,3642  21'154 1          DAS     LONGTIME

 1033   REF   9 LAST1073  01,3643  11'154 1          DCS     LONGTIME +1     THE REASONING BEHIND THIS PART IS
 1034   REF   1           01,3644  1 3663 0          TCF     MUCHTIME        INVOLVED, TAKING INTO ACCOUNT THAT THE
A1035                                                                       WORDS MAY NOT BE SIGNED CORRECTED (DP
A1036                                                                       BASIC INSTRUCTIONS
A1037                                                                       DO NOT SIGN CORRECT) AND THAT WE SUBTRAC
A1038                                                                       TED BIT14 (1 OVER HALF THE POS. VALUE
A1039                                                                       REPRESENTIBLE IN SINGLE WORD)
```

L WAITLIST USER'S OWN PAGE NO. 13 53 E3

```
 1040                          01,3645  1 3646 1          NOOP                    CAN;T GET HERE    **********
 1041                          01,3646  1 3647 0          TCF     +1
 1042  REF  10 LAST1073        01,3647  11'153 0          CCS     LONGTIME
 1043  REF   2 LAST1073        01,3650  1 3663 0          TCF     MUCHTIME
 1044                          01,3651    00000 1 DPBIT14 DCI     00000
 1045                          01,3652    20000 0         DCI     20000

A1046                                                                          LONGCALL
 1047  REF  58 LAST1061        01,3653  3 7746 0 LASTTIME CA      BIT14         GET BACK THE CORRECT DELTA TFOR WAITLIST
 1048  REF  11 LAST1074        01,3654  27'154 1          ADS     LONGTIME +1
 1049  REF 126 LAST 921        01,3655  0 5663 1          TC      WAITLIST
10495  REF  64 LAST1073                        E3         EBANK=  LST1
 1050                          01,3656    03670 0         2CADR   GETCADR         THE ENTRY TO OUR LONGCADR
C1050  REF   1                 01,3657    02063 0
 1051  REF   1                 01,3660  3 3672 1 LONGRTRN CA      TSKOVCDR      SET IT UP SO THAT ONLY THE FIRST EXIT IS
 1052  REF   3 LAST1073        01,3661  53'435 0          DXCH    LONGEXIT      TO THE CALLER OF LONGCALL
 1053                          01,3662  52 006 0          DTCB                  THE REST ARE TO TASKOVER

 1054  REF  59 LAST1074        01,3663  3 7746 0 MUCHTIME CA      BIT14         WE HAVE OVER OUR ABOUT 1,25 MINUTES
 1055  REF 127 LAST1074        01,3664  0 5663 1          TC      WAITLIST      SO SET UP FOR ANOTHER CYCLE THROUGH HERE
10555  REF  65 LAST1074                        E3         EBANK=  LST1
 1056                          01,3665    03640 0         2CADR   LONGCYCL
C1056  REF   1                 01,3666    02063 0
 1057  REF   1                 01,3667  1 3660 0          TCF     LONGRTRN      NOW EXIT PROPERLY

R10571          *** WAITLIST TASK  GETCADR ***
 1058  REF   2 LAST1073        01,3670  53'152 1 GETCADR  DXCH    LONGCADR      GET THE LONGCALL THAT WE WISHED TO START
 1059                          01,3671  52 006 0          DTCB                  AND TRANSFER CONTROL TO IT

 1062  REF 124 LAST1065        01,3672    05727 0 TSKOVCDR GENADR TASKOVER
```

L AGC BLOCK TWO SELF-CHECK USER'S OWN PAGE NO. 1 S3

```
R000001 PROGRAM DESCRIPTION                                   DATE  14 FEBRUARY 1967
R000003 PROGRAM NAME -  SELF-CHECK                            LOG SECTION AGC BLOCK TWO SELF-CHECK
R000005 MOD NO - 0                                            ASSEMBLY SUNBURST REV 107
R000007 MOD BY - GAUNTT
```

R000008 FUNCTIONAL DESCRIPTION

R000009 PROGRAM HAS TWO MAIN PARTS. THE FIRST IS SELF-CHECK WHICH RUNS AS A ZERO PRIORITY JOB WITH NO CORE SET, AS
R000011 PART OF THE BACK-UP IDLE LOOP. THE SECOND IS SHOW-BANKSUM WHICH RUNS AS A REGULAR EXECUTIVE JOB WITH ITS OWN
R000013 STARTING VERB.
R000014 THE PURPOSE OF SELF-CHECK IS TO CHECK OUT VARIOUS PARTS OF THE COMPUTER AS OUTLINED BELOW IN THE OPTIONS.
R000016 THE PURPOSE OF SHOW-BANKSUM IS TO DISPLAY THE SUM OF EACH BANK , ONE AT A TIME.
R000018 A THIRD SECTION, DSKYCHK, LIGHTS UP ALL THE DSKY ELECTROLUMINESCENT ELEMENTS.
R00002 IN ALL THERE ARE 15 POSSIBLE OPTIONS IN THIS BLOCK II VERSION OF SELF-CHECK. MORE DETAIL DESCRIPTION MAY BE
R000022 FOUND IN E-2065 BLOCK II AGC SELF-CHECK AND SHOW BANKSUM BY EDWIN D. SMALLY DECEMBER 1966.
R000024 THE DIFFERENT OPTIONS ARE CONTROLLED BY PUTTING DIFFERENT NUMBERS IN THE SMODE REGISTER (NOUN 27). BELOW IS
R000026 A DESCRIPTION OF WHAT PARTS OF THE COMPUTER THAT ARE CHECKED BY THE OPTIONS, AND THE CORRESPONDING NUMBER, IN
R000028 OCTAL, TO LOAD INTO SMODE.
R000029 +-1 ALL PULSES POSSIBLE BY INTERNAL CONTROL OF THE COMPUTER.
R00003 +-2 ALL THE IN-OUT INSTRUCTION PULSES.
R000031 +-3 SPECIAL AND CENTRAL REGISTERS, ALL BIT COMBINATIONS.
R000032 +-4 ERASABLE MEMORY
R000033 +-5 FIXED MEMORY
R000034 +-6,7,10 EVERYTHING IN THE PREVIOUS 5 OPTIONS.
R000035 +-11 TURNS ON THE ELECTROLUMINESCENT DISPLAY IN THE DSKY.
R000036 -0 SAME AS +-10 UNTIL AN ERROR IS DETECTED.
R000037 +0 NO CHECK, PUTS COMPUTER INTO THE BACKUP IDLE LOOP.

R000038 WARNINGS

R000039 SMODE LOADED WITH GREATER THAN OCTAL 11 PUTS COMPUTER INTO THE BACKUP IDLE LOOP.
R000041

R000042 CALLING SEQUENCE

```
R000043      TO CALL SELF-CHECK KEY IN
R000044           V 21 N 27 E  OPTION NUMBER E
R000045      TO CALL DSKYCHK KEY IN
R000046           V 21 N 27 E +-11 E
R000047      TO CALL SHOW-BANKSUM KEY IN
R000048           V 56 E          DISPLAYS FIRST BANK
R000049           V 33 E          PROCEED, DISPLAYS NEXT BANK
```

L AGC BLOCK TWO SELF-CHECK USER'S OWN PAGE NO. 2 53

R00005 EXIT MODES, NORMAL AND ALARM

R000051 SELF_CHECK NORMALLY CONTINUES INDEFINITELY UNLESS THERE IS AN ERROR DETECTED. IF SO + OPTION NUMBERS PUT
R000053 COMPUTER INTO BACKUP IDLE LOOP, - OPTION NUMBERS RESTART THE OPTION.
R000054 THE -0 OPTION PROCEEDS FROM THE LINE FOLLOWING THE LINE WHERE THE ERROR WAS DETECTED.
R000056 COMPLETION OF DSKYCHK PUTS THE COMPUTER INTO THE BACKUP IDLE LOOP.
R000057 SHOW_BANKSUM PROCEEDS UNTIL A TERMINATE IS KEYED IN (V 34 E). THE COMPUTER IS PUT INTO THE BACKUP IDLE LOOP
R000059

R00006 OUTPUT

R000061 SELF_CHECK UPON DETECTING AN ERROR LOADS THE SELF-CHECK ALARM CONSTANT (01102) INTO THE FAILREG SET AND
R000063 TRIGGERS THE ALARM. THE ALARM ROUTINE DISPLAYS THE THREE FAILREGS. IF OPERATOR DESIRES FURTHER INFORMATION HE
R000065 MAY KEY IN V 05 N 31 E DSKY DISPLAY IN R1 WILL BE ADDRESS +1 OF WHERE THE ERROR WAS DETECTED, IN R2 THE
R000067 BANK NUMBER OF SELF-CHECK (37 OCTAL), AND IN R3 THE TOTAL NUMBER OF ERRORS DETECTED BY SELF-CHECK SINCE THE LAST
R000069 FRESH START.
R00007 DSKYCHK LIGHTS UP THE DSKY DISPLAY ELEMENTS STARTING WITH THE DIGIT9 IN ALL POSITIONS. EACH DISPLAY LASTS
R000072 5 SECONDS.
R000073 SHOW_BANKSUM STARTING WITH BANK 0 DISPLAYS IN R1 +- THE BANK SUM (SHOULD EQUAL THE BANK NUMBER), IN R2 THE
R000075 BANK NUMBER, AND IN R3 THE BUGGER WORD.

R000076 ERASABLE INITIALIZATION REQUIRED

R000077 ACCOMPLISHED BY FRESH START
R000078 SMODE & ERESTORE SET TO +0

R000079 DEBRIS

R00008 ALL EXITS FROM THE CHECK OF ERASABLE (ERASCHK) RESTORE ORIGINAL CONTENTS TO REGISTERS UNDER CHECK.
R000082 EXCEPTION IS A RESTART. RESTART THAT OCCURS DURING ERASCHK DOES A FRESH START.
R000084

```
0001                                  37,2000          BANK   37
0002   REF  64 LAST 997                 7763  SBIT1    EQUALS BIT1
0003   REF  34 LAST 997                 7762  SBIT2    EQUALS BIT2
0004   REF  25 LAST 997                 7761  SBIT3    EQUALS BIT3
0005   REF  49 LAST 997                 7760  SBIT4    EQUALS BIT4
0006   REF  33 LAST 965                 7757  SBIT5    EQUALS BIT5
0007   REF  46 LAST1008                 7756  SBIT6    EQUALS BIT6
0008   REF  41 LAST1048                 7755  SBIT7    EQUALS BIT7
```

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```
0009   REF  36 LAST1066                7754  SBIT8    EQUALS BIT8
0010   REF  21 LAST 887                7753  SBIT9    EQUALS BIT9
0011   REF  49 LAST1061                7752  SBIT10   EQUALS BIT10
0012   REF  44 LAST1061                7751  SBIT11   EQUALS BIT11
0013   REF  30 LAST1061                7750  SBIT12   EQUALS BIT12
0014   REF  32 LAST1061                7747  SBIT13   EQUALS BIT13
0015   REF  60 LAST1074                7746  SBIT14   EQUALS BIT14
0016   REF  42 LAST1043                7745  SBIT15   EQUALS BIT15

0017   REF 303 LAST1071                7767  S+ZERO   EQUALS ZERO
0018   REF  65 LAST1076                7763  S+1      EQUALS BIT1
0019   REF  35 LAST1076                7762  S+2      EQUALS BIT2
0020   REF  41 LAST 998                6311  S+3      EQUALS THREE
0021   REF  31 LAST1027                7761  S+4      EQUALS FOUR
0022   REF  18 LAST 984                7766  S+5      EQUALS FIVE
0023   REF  21 LAST 999                6306  S+6      EQUALS SIX
0024   REF  20 LAST1029                7765  S+7      EQUALS SEVEN
0025   REF  17 LAST1040                4564  S8BITS   EQUALS LOW8          00377
0026                        37,2000  00050 1 CNTRCON  OCTAL  00050          USED IN CNTRCHK
0027                        37,2001  00061 0 ERASCON1 OCTAL  00061          USED IN ERASCHK
0028                        37,2002  01374 0 ERASCON2 OCTAL  01374          USED IN ERASCHK
0029                        37,2003  01400 1 ERASCON6 OCTAL  01400          USED IN ERASCHK
0030                        37,2004  01461 0 ERASCON3 OCTAL  01461          USED IN ERASCHK
0031                        37,2005  01774 1 ERASCON4 OCTAL  01774          USED IN ERASCHK
0032   REF  17 LAST 975                5337  S10BITS  EQUALS LOW10         01777, USED IN ERASCHK
0033   REF   2 LAST 176                5634  SBNK03   EQUALS PRIO6         06000, USED IN ROPECHK
0034                        37,2006  00060 1 SIXTY    OCTAL  00060
0035                        37,2007  60017 1 SUPRCON  OCTAL  60017          USED IN ROPECHK
0036                        37,2010  17777 0 S13BITS  OCTAL  17777
0037                        37,2011  25252 0 CONC+S1  OCTAL  25252          USED IN CYCLSHFT
0038                        37,2012  37737 0 OVCON    OCTAL  37737          USED IN RUPTCHK
0039                        37,2013  37776 0 DVCON    OCTAL  37776
0040                        37,2014  52400 1 CONC+S2  OCTAL  52400          USED IN CYCLSHFT
0041                        37,2015  76777 1 ERASCON5 OCTAL  76777
0042                        37,2016  77770 1 S-7      OCTAL  77770
0043   REF   2 LAST 959                6156  S-4      EQUALS NEG4
0044   REF   4 LAST 810                5340  S-3      EQUALS NEG3
0045   REF   5 LAST1049                5336  S-2      EQUALS NEG2
0046   REF  12 LAST1011                7771  S-1      EQUALS NEGONE
0047   REF   7 LAST 771                7770  S-ZERO   EQUALS NEG0

0048   REF  66 LAST1074                  E3          EBANK= LST1
0049   REF   1                  37,2017  01371 0 ADRS1    ADRES  SKEEP1
0050   REF  40 LAST1048         37,2020  00021 1 SRADRS   ADRES  SR
0051   REF   3 LAST1060         37,2021  02115 0 SELFADRS ADRES  SELFCHK      SELFCHK RETURN ADDRESS. SHOULD BE PUT
A0052                                                                        IN SELFRET WHEN GOING FROM SELFCHK TO
A0053                                                                        SHOWSUM AND PUT IN SKEEP1 WHEN GOING
A0054                                                                        FROM SHOWSUM TO SELF-CHECK.

00541  REF   3 LAST  92         37,2022  3 1353 0 PRERORS  CA     ERESTORE    IS IT NECESSARY TO RESTORE ERASABLE
```

L AGC BLOCK TWO SELF-CHECK USER'S OWN PAGE NO. 4 S3 E3

```
00542                          37,2023  0 0006 1            EXTEND
00543  REF    1                37,2024  1 2033 1            BZF     ERRORS          NO
00544                          37,2025  0 0006 1            EXTEND
00545  REF    1                37,2026  3 1376 1            DCA     SKEEP5
00546  REF    1                37,2027  51'377 0            INDEX   SKEEP7
00547                          37,2030  52 001 1            DXCH    0000            RESTORE THE TWO ERASABLE REGISTERS
00548  REF    1                37,2031  3 7767 0            CA      S+ZERO
00549  REF    4 LAST1077       37,2032  55'353 1            TS      ERESTORE
0055                           37,2033  0 0004 0  ERRORS     INHINT
00555  REF  339 LAST1073       37,2034  3 0002 0            CA      Q
0056   REF    3 LAST 759       37,2035  55'357 0            TS      SFAIL           SAVE Q FOR FAILURE LOCATION
00565  REF    8 LAST 336       37,2036  55'363 1            TS      ALMCADR         FOR DISPLAY WITH BBANK AND ERCOUNT
0057   REF    1                37,2037  25'365 0            INCR    ERCOUNT         KEEP TRACK OF NUMBER OF MALFUNCTIONS.
0058   REF    2 LAST 313       37,2040  0 4760 1  TCALARM2  TC      ALARM2
0059                           37,2041   01102 0            OCT     01102           SELF-CHECK MALFUNCTION INDICATOR
0060   REF    6 LAST 497       37,2042  11'355 1            CCS     SMODE
0061   REF    2 LAST1078       37,2043  3 7767 0            CA      S+ZERO
0062   REF    7 LAST1078       37,2044  55'355 1            TS      SMODE
0063   REF    4 LAST1077       37,2045  0 2115 0            TC      SELFCHK         GO TO IDLE LOOP
0064   REF    4 LAST1078       37,2046  0 1357 1            TC      SFAIL           CONTINUE WITH SELF-CHECK

0065   REF  376 LAST1069       37,2047  4 0000 0  +0CHK      CS      A
0066   REF  377 LAST1078       37,2050  10 000 0  -0CHK      CCS     A
0067   REF    2 LAST1078       37,2051  1 2033 1            TCF     ERRORS
0068   REF    3 LAST1078       37,2052  1 2033 1            TCF     ERRORS
0069   REF    4 LAST1078       37,2053  1 2033 1            TCF     ERRORS
0070   REF  340 LAST1078       37,2054  0 0002 0            TC      Q

0071   REF  378 LAST1078       37,2055  4 0000 0  +1CHK      CS      A
0072   REF  379 LAST1078       37,2056  10 000 0  -1CHK      CCS     A
0073   REF    1                37,2057  1 2022 1            TCF     PRERRORS
0074   REF    2 LAST1078       37,2060  1 2022 1            TCF     PRERRORS
0075   REF  380 LAST1078       37,2061  10 000 0            CCS     A
0076   REF    3 LAST1078       37,2062  1 2022 1            TCF     PRERRORS
0077   REF  341 LAST1078       37,2063  0 0002 0            TC      Q

0078                           37,2064  0 0006 1  SMODECHK  EXTEND
0079   REF    2 LAST1077       37,2065  23'371 0            DXCH    SKEEP1
0080   REF    2 LAST1060       37,2066  0 5605 1            TC      CHECKNJ         CHECK FOR NEW JOB
0081   REF    8 LAST1078       37,2067  11'355 1            CCS     SMODE
0082   REF    1                37,2070  0 2075 1            TC      SOPTIONS
0083   REF    1                37,2071  0 2066 0            TC      SMODECHK +2     TO BACKUP IDLE LOOP
0084   REF    2 LAST1078       37,2072  0 2075 1            TC      SOPTIONS
0085   REF    1                37,2073  25'366 0            INCR    SCOUNT
0086   REF    3 LAST1078       37,2074  0 1371 0            TC      SKEEP1          CONTINUE WITH SELF-CHECK

0087   REF    1                37,2075  6 2016 1  SOPTIONS  AD      S-7
0088                           37,2076  0 0006 1            EXTEND
0089                           37,2077  6 2101 0            BZMF    +2              FOR OPTIONS BELOW NINE.
0090   REF    1                37,2100  0 3604 0  BNKOPTN   TC      SBNKOPTN        FOR OPTIONS ABOVE EIGHT
```

L AGC BLOCK TWO SELF-CHECK USER'S OWN PAGE NO. 5 S3 E3

```
 0091   REF   2 LAST1078     37,2101  25'366 0            INCR    SCOUNT      FOR OPTIONS BELOW NINE.
 0092   REF   1              37,2102  6 7765 1            AD      S+7

 0093   REF 381 LAST1078     37,2103  50 000 1            INDEX   A
 0094   REF   1              37,2104  0 2105 1            TC      SOPTION1
 0095   REF   1              37,2105  0 2116 0  SOPTION1  TC      TC+TCF
 0096   REF   1              37,2106  0 3003 1  SOPTION2  TC      IN-OUT1
 0097   REF   1              37,2107  0 3057 0  SOPTION3  TC      COUNTCHK
 0098   REF   1              37,2110  0 3153 0  SOPTION4  TC      ERASCHK
 0099   REF   1              37,2111  0 3340 0  SOPTION5  TC      ROPECHK
 0100   REF   4 LAST1078     37,2112  0 1371 0  SOPTION6  TC      SKEEP1
 0101   REF   5 LAST1079     37,2113  0 1371 0  SOPTION7  TC      SKEEP1
 0102   REF   6 LAST1079     37,2114  0 1371 0  SOPTON10  TC      SKEEP1      CONTINUE WITH SELF-CHECK

 0103   REF   2 LAST1078     37,2115  0 2064 1  SELFCHK   TC      SMODECHK    ** CHARLEY, COME IN HERE

R0104   TC+TCF CHECKS ALL OF THE PULSES OF TCF AND ALL OF THE PULSES OF TC
R0105   EXCEPT ABILITY TO TC TO ERASABLE.
R0106   ALSO FIRST TIME CS FIXED MEMORY IS USED
 0107                        37,2116  0 2120 0  TC+TCF   TC      +2
 0108   REF   1              37,2117  0 2125 0            TC      CCSCHK
 0109                        37,2120  1 2122 0            TCF     +2          $ TCF FIXED MEMORY
 0110   REF   5 LAST1078     37,2121  0 2033 0            TC      ERRORS
 0111   REF   1              37,2122  4 6311 0            CS      S+3         $ CS FIXED MEMORY
 0112   REF 342 LAST1078     37,2123  0 0002 0            TC      Q           $
 0113   REF   6 LAST1079     37,2124  0 2033 0            TC      ERRORS

R0114   CCSCHK CHECKS ALL OF CCS EXCEPT RB WG.
R0115   ALSO CHECKS TS ERASABLE, CS SC, AND CS ERASABLE MEMORY.
 0116   REF 382 LAST1079     37,2125  10 000 0  CCSCHK   CCS     A           $ CCS SC, C(A) = -3
 0117   REF   7 LAST1079     37,2126  0 2033 0            TC      ERRORS
 0118   REF   8 LAST1079     37,2127  0 2033 0            TC      ERRORS
 0119                        37,2130  0 2132 0            TC      +2
 0120   REF   9 LAST1079     37,2131  0 2033 0            TC      ERRORS
 0121   REF 383 LAST1079     37,2132  10 000 0            CCS     A           $ C(A) = +2, RESULT OF CCS -NUMBER
 0122                        37,2133  0 2137 0            TC      +4
 0123   REF  10 LAST1079     37,2134  0 2033 0            TC      ERRORS
 0124   REF  11 LAST1079     37,2135  0 2033 0            TC      ERRORS
 0125   REF  12 LAST1079     37,2136  0 2033 0            TC      ERRORS
 0126   REF   7 LAST1079     37,2137  55'371 1            TS      SKEEP1      $ TS ERASABLE
 0127   REF   8 LAST1079     37,2140  11'371 1            CCS     SKEEP1      $ CCS ERASABLE, C(A) = +1, RESULT OF
 0128                        37,2141  0 2145 0            TC      +4          CCS +NUMBER
 0129   REF  13 LAST1079     37,2142  0 2033 0            TC      ERRORS
 0130   REF  14 LAST1079     37,2143  0 2033 0            TC      ERRORS
 0131   REF  15 LAST1079     37,2144  0 2033 0            TC      ERRORS
 0132   REF 384 LAST1079     37,2145  10 000 0            CCS     A           $ C(A) = +0, RESULT OF CCS +1, CHECKS CI
 0133   REF  16 LAST1079     37,2146  0 2033 0            TC      ERRORS
 0134                        37,2147  0 2152 0            TC      +3
 0135   REF  17 LAST1079     37,2150  0 2033 0            TC      ERRORS
 0136   REF  18 LAST1079     37,2151  0 2033 0            TC      ERRORS
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 0137   REF 385 LAST1079     37,2152  4 0000 0            CS      A               $ CS SC
 0138   REF 386 LAST1080     37,2153  10 000 0            CCS     A               $ C(A) = -0, RESULT OF CCS +0
 0139   REF  19 LAST1079     37,2154  0 2033 0            TC      ERRORS
 0140   REF  20 LAST1080     37,2155  0 2033 0            TC      ERRORS
 0141   REF  21 LAST1080     37,2156  0 2033 0            TC      ERRORS
 0142   REF 387 LAST1080     37,2157  10 000 0            CCS     A               $ RESULT OF CCS -0
 0143   REF  22 LAST1080     37,2160  0 2033 0            TC      ERRORS
 0144                        37,2161  0 2164 0            TC      +3
 0145   REF  23 LAST1080     37,2162  0 2033 0            TC      ERRORS
 0146   REF  24 LAST1080     37,2163  0 2033 0            TC      ERRORS
 0147   REF   9 LAST1079     37,2164  4 1371 1            CS      SKEEP1          $ CS ERASABLE. ALSO CHECKS BACK INTO
 0148   REF   1              37,2165  0 2056 0            TC      -1CHK           ERASABLE SEQUENCE.

R0149   BZMFCHK CHECKS ALL PULSES OF BZMF.
R0150   ALSO CHECKS CA FIXED MEMORY.
 0151   REF   1              37,2166  3 7753 1  BZMFCHK   CAF     SBIT9           $ CA FIXED MEMORY
 0152                        37,2167  0 0006 1            EXTEND
 0153   REF   1              37,2170  6 2211 1            BZMF    ERRBZMF
 0154   REF 388 LAST1080     37,2171  4 0000 0            CS      A
 0155                        37,2172  0 0006 1            EXTEND
 0156                        37,2173  6 2175 0            BZMF    +2              $
 0157   REF  25 LAST1080     37,2174  0 2033 0            TC      ERRORS
 0158   REF   1              37,2175  3 3505 1            CA      S+MAX
 0159   REF   1              37,2176  6 7763 1            AD      S+1
 0160                        37,2177  0 0006 1            EXTEND
 0161   REF   1              37,2200  6 2212 1            BZMF    ERRBZMF2        $ + OVERFLOW, CHECK 01-0000
 0162   REF   3 LAST1078     37,2201  3 7767 0            CA      S+ZERO
 0163                        37,2202  0 0006 1            EXTEND
 0164                        37,2203  6 2205 1            BZMF    +2              $
 0165   REF  26 LAST1080     37,2204  0 2033 0            TC      ERRORS
 0166   REF 389 LAST1080     37,2205  4 0000 0            CS      A
 0167                        37,2206  0 0006 1            EXTEND
 0168                        37,2207  6 2213 0            BZMF    +4              $
 0169   REF  27 LAST1080     37,2210  0 2033 0            TC      ERRORS
 0170   REF  28 LAST1080     37,2211  0 2033 0  ERRBZMF   TC      ERRORS          FROM BZMF WITH +NON-ZERO
 0171   REF  29 LAST1080     37,2212  0 2033 0  ERRBZMF2  TC      ERRORS          OVERFLOW WITH +0

R0172   RESTORE1 AND 2 CHECKS INSTRUCTIONS (WITH STAR) ABILITY TO READ BACK INTO
R0173   ERASABLE MEMORY. NOT NORMALLY INTERESTED IN CONTENTS OF A REGISTER.
R0174   FIRST TIME MANY INSTRUCTIONS ARE USED.
R0175   RESTORE1 ALSO CHECKS INDEX (WITHOUT EXTRACODE) ERASABLE, CA ERASABLE,
R0176   AND MASK ERASABLE.
 0177   REF   1              37,2213  3 2020 1  RESTORE1 CAF     SRADRS          ADDRESS OF SR
 0178   REF   2 LAST1078     37,2214  55'377 1            TS      SKEEP7
 0179   REF   1              37,2215  3 4564 1            CA      SBBITS          00377
 0180   REF   3 LAST1080     37,2216  51'377 0            NDX     SKEEP7          $ INDEX ERASABLE                *
 0181                        37,2217  54 000 0            TS      0000            TS SR, C(SR) = 00177
 0182   REF  41 LAST1077     37,2220  10 021 0            CCS     SR              C(SR) = 00077                   *
 0183   REF   4 LAST1080     37,2221  51'377 0            NDX     SKEEP7          CHECKS C(SKEEP7) CORRECT
 0184                        37,2222  4 0000 0            CS      0000            C(SR) = 00037
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 0185   REF  42 LAST1080     37,2223  6 0021 1          AD      SR      C(SR) = 00017                          *
 0186                        37,2224  0 0006 1          EXTEND
 0187   REF  43 LAST1081     37,2225  20 021 0          MSU     SR      C(SR) = 00007                          *
 0188                        37,2226  0 0006 1          EXTEND
 0189   REF  44 LAST1081     37,2227  60 021 1          SU      SR      C(SR) = 00003                          *
 0190   REF  45 LAST1081     37,2230  3 0021 1          CA      SR      $ C(SR) = +1, C(A) = +3, CA ERASABLE   *
 0191   REF  46 LAST1081     37,2231  7 0021 0          MASK    SR      $ B(SR) = C(SR) = +1, MASK ERASABLE    *
 0192   REF   1              37,2232  0 2055 0          TC      +1CHK
 0193                        37,2233  0 0006 1          EXTEND
 0194   REF  47 LAST1081     37,2234  7 0021 0          MP      SR
 0195                        37,2235  0 0006 1          EXTEND
 0196   REF  48 LAST1081     37,2236  10 021 0          DV      SR
 0197   REF  49 LAST1081     37,2237  3 0021 1          CA      SR      $ CA ERASABLE
 0198   REF   2 LAST1081     37,2240  0 2055 0          TC      +1CHK   MAKES SURE MASK, MP, AND DV DO NOT EDIT.

R0199   RESTORE2 ALSO CHECKS XCH ERASABLE,INDEX (WITH EXTRACODE) ERASABLE AND
R0200   FIXED MEMORY, DCS ERASABLE, CA SC, AND DCA ERASABLE.
 0201   REF   1              37,2241  3 2017 0  RESTORE2 CAF     ADRS1   ADDRESS OF SKEEP1
 0202   REF   1              37,2242  55'376 0          TS      SKEEP6
 0203   REF   1              37,2243  3 7771 1          CA      S-1
 0204   REF  10 LAST1080     37,2244  55'371 1          TS      SKEEP1  -1
 0205   REF 390 LAST1080     37,2245  4 0000 0          CS      A
 0206   REF  11 LAST1081     37,2246  57'371 0          XCH     SKEEP1  $ XCH ERASABLE, C(SKEEP1) = +1
 0207   REF   1              37,2247  57'372 0          XCH     SKEEP2  $ XCH ERASABLE, C(SKEEP2) = -1
 0208                        37,2250  0 0006 1          EXTEND
 0209   REF   2 LAST1081     37,2251  5 1376 1          NDX     SKEEP6  $ NDX ERASABLE                         *
 0210                        37,2252  3 0001 0          DCA     0000    DCA ERASABLE                           *
 0211                        37,2253  0 0006 1          EXTEND
 0212   REF   2 LAST1081     37,2254  5 2017 0          NDX     ADRS1   $ NDX FIXED MEMORY                     *
 0213                        37,2255  4 0001 1          DCS     0000    $ DCS ERASABLE MEMORY                  *
 0214   REF   2 LAST1080     37,2256  0 2056 0          TC      -1CHK   MAKES SURE DCS ERASABLE OK
 0215   REF 187 LAST1064     37,2257  3 0001 0          CA      L       $ CA SC
 0216   REF   3 LAST1081     37,2260  0 2055 0          TC      +1CHK
 0217                        37,2261  0 0006 1          EXTEND
 0218   REF   3 LAST1081     37,2262  5 1376 1          NDX     SKEEP6  MAKE SURE C(SKEEP6) IS STILL CORRECT
 0219                        37,2263  3 0001 0          DCA     0000    $ DCA ERASABLE
 0220   REF   4 LAST1081     37,2264  0 2055 0          TC      +1CHK
 0221   REF 188 LAST1081     37,2265  3 0001 0          CA      L
 0222   REF   3 LAST1081     37,2266  0 2056 0          TC      -1CHK

R0223   RESTORE3 CHECKS ABILITY TO RESTORE INSTRUCTIONS BACK INTO ERASABLE
R0224   MEMORY. IT IS ONLY NECESSARY TO RESTORE ONE INSTRUCTION BECAUSE THE
R0225   G REGISTER DOES NOT CHANGE.
R0226   ALSO CHECKS TC TO ERASABLE MEMORY.
 0227   REF   1              37,2267  3 7745 0  RESTORE3 CA      SBIT15  CS
 0228   REF  12 LAST1081     37,2270  55'371 1          TS      SKEEP1  40000
 0229   REF   1              37,2271  3 7762 0          CA      S+2     TC 0
 0230   REF   2 LAST1081     37,2272  55'372 1          TS      SKEEP2
 0231   REF   2 LAST1080     37,2273  3 7763 1          CA      S+1     +1
 0232   REF  13 LAST1081     37,2274  0 1371 0          TC      SKEEP1  $ TC ERASABLE
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L       AGC BLOCK TWO SELF-CHECK                                        USER'S OWN PAGE NO.  8          S3  E3

 0233   REF   4 LAST1081     37,2275  0 2056 0          IC      -1CHK          FIRST TIME BACK FROM ERASABLE.
 0234   REF  14 LAST1081     37,2276  0 1371 0          IC      SKEEP1
 0235   REF   1              37,2277  0 2050 0          IC      -0CHK          SECOND TIME BACK FROM ERASABLE.

R0236   BZFCHK CHECKS ALL PULSES OF BZF.
 0237   REF   1              37,2300  3 7766 1  BZFCHK  CAF     S+5
 0238                        37,2301  0 0006 1          EXTEND
 0239   REF   1              37,2302  1 2325 0          BZF     ERRBZF1        $
 0240   REF 391 LAST1081     37,2303  4 0000 0          CS      A
 0241                        37,2304  0 0006 1          EXTEND
 0242   REF   1              37,2305  1 2326 0          BZF     ERRBZF2        $
 0243   REF   2 LAST1080     37,2306  3 3505 1          CA      S+MAX
 0244   REF   3 LAST1081     37,2307  6 7763 1          AD      S+1            01-00000
 0245                        37,2310  0 0006 1          EXTEND
 0246   REF   1              37,2311  1 2327 1          BZF     ERRBZF3        $
 0247   REF 392 LAST1082     37,2312  4 0000 0          CS      A
 0248                        37,2313  0 0006 1          EXTEND
 0249   REF   1              37,2314  1 2330 1          BZF     ERRBZF4        $
 0250   REF   4 LAST1080     37,2315  3 7767 0          CAF     S+ZERO
 0251                        37,2316  0 0006 1          EXTEND
 0252                        37,2317  1 2321 1          BZF     +2             $
 0253   REF  30 LAST1080     37,2320  0 2033 0          TC      ERRORS
 0254   REF 393 LAST1082     37,2321  4 0000 0          CS      A
 0255                        37,2322  0 0006 1          EXTEND
 0256                        37,2323  1 2331 0          BZF     +6             $
 0257   REF  31 LAST1082     37,2324  0 2033 0          TC      ERRORS
 0258   REF  32 LAST1082     37,2325  0 2033 0  ERRBZF1  TC      ERRORS         +NON-ZERO
 0259   REF  33 LAST1082     37,2326  0 2033 0  ERRBZF2  TC      ERRORS         -NON-ZERO
 0260   REF  34 LAST1082     37,2327  0 2033 0  ERRBZF3  TC      ERRORS         01-00000
 0261   REF  35 LAST1082     37,2330  0 2033 0  ERRBZF4  TC      ERRORS         10-37777

R0262   DXCH+DIM CHECKS ALL PULSES OF DXCH AND DIM.
R0263   ALSO CHECKS TS WITH OVERFLOW, TS SC, CA SC, AND AD ERASABLE.
 0264   REF   3 LAST1082     37,2331  3 3505 1  DXCH+DIM CA      S+MAX
 0265   REF   2 LAST1081     37,2332  6 7762 0          AD      S+2            OVERFLOW WITH +1
 0266   REF  15 LAST1082     37,2333  55'371 1          TS      SKEEP1         $ TS WITH OVERFLOW, +1
 0267   REF  36 LAST1082     37,2334  0 2033 0          TC      ERRORS
 0268   REF 394 LAST1082     37,2335  4 0000 0          CS      A
 0269   REF   3 LAST1081     37,2336  55'374 1          TS      SKEEP2
 0270   REF   4 LAST1082     37,2337  4 3505 0          CS      S+MAX
 0271   REF 189 LAST1081     37,2340  54 001 1          TS      L              $ TS SC, 40000
 0272   REF 395 LAST1082     37,2341  4 0000 0          CS      A              37777
 0273   REF  16 LAST1082     37,2342  53'372 1          DXCH    SKEEP1         $ DXCH ERASABLE
 0274   REF   5 LAST1081     37,2343  0 2055 0          TC      +1CHK
 0275   REF 190 LAST1082     37,2344  3 0001 0          CA      L              $ CA SC
 0276   REF   5 LAST1082     37,2345  0 2056 0          TC      -1CHK
 0277                        37,2346  0 0006 1          EXTEND
 0278   REF  17 LAST1082     37,2347  27'371 1          DIM     SKEEP1         $ DIM ERASABLE, DIM + NUMBER, 37776
 0279                        37,2350  0 0006 1          EXTEND
 0280   REF   4 LAST1082     37,2351  27'372 1          DIM     SKEEP2         $ DIM - NUMBER, 40001
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L       AGC BLOCK TWO SELF-CHECK                                        USER'S OWN PAGE NO.  9          53  E3

 0281   REF   5 LAST1082    37,2352  3 3505 1          CA      S+MAX          37777
 0282   REF   5 LAST1082    37,2353  6 1372 0          AD      SKEEP2         $ AD ERASABLE, +1
 0283   REF   6 LAST1082    37,2354  0 2055 0          IC      +1CHK
 0284   REF   6 LAST1083    37,2355  4 3505 0          CS      S+MAX          40000
 0285   REF  18 LAST1082    37,2356  6 1371 0          AD      SKEEP1         -1
 0286   REF   6 LAST1082    37,2357  0 2056 0          IC      -1CHK
 0287   REF   4 LAST1082    37,2360  3 7763 1          CA      S+1            +1
 0288                       37,2361  0 0006 1          EXTEND
 0289   REF 396 LAST1082    37,2362  26 000 0          DIM     A              $ DIM SC, DIM +1
 0290                       37,2363  0 0006 1          EXTEND
 0291   REF 397 LAST1083    37,2364  26 000 0          DIM     A              $ DIM -0
 0292   REF   2 LAST1082    37,2365  0 2050 0          IC      -0CHK
 0293                       37,2366  0 0006 1          EXTEND
 0294   REF 398 LAST1083    37,2367  26 000 0          DIM     A              $ DIM +0
 0295   REF   1             37,2370  0 2047 0          IC      +0CHK

R0296   DAS+INCR CHECKS ALL PULSES OF DAS AND INCR,
R0297   ALSO CHECKS DCA FIXED, LXCH SC, DCA ERASABLE, AD ERASABLE, DCS FIXED,
R0298   DCS ERASABLE, AND XCH SC.
 0299   REF   2 LAST1081    37,2371  3 7771 1  DAS+INCR CA      S-1
 0300   REF 191 LAST1082    37,2372  54 001 1  DAS++     TS      L              -1
 0301   REF   3 LAST1082    37,2373  3 7762 0          CA      S+2            +2
 0302   REF 399 LAST1083    37,2374  20 001 1          DAS     A              $ DAS SC, C(A) = +4 AND C(L) = -2
 0303   REF   1             37,2375  6 5340 0          AD      S-3            $ AD FIXED MEMORY
 0304   REF   7 LAST1083    37,2376  0 2055 0          IC      +1CHK
 0305   REF   5 LAST1083    37,2377  3 7763 1          CA      S+1
 0306   REF 192 LAST1083    37,2400  6 0001 0          AD      L              $ AD SC, -1
 0307   REF   7 LAST1083    37,2401  0 2056 0          IC      -1CHK
R0308   DAS WITH INTERFLOW IN LOW ORDER AND NET OVERFLOW
 0309                       37,2402  0 0006 1  DAS+-     EXTEND
 0310   REF   7 LAST1083    37,2403  3 3506 1          DCA     S+MAX          $DCA FIXED MEMORY
 0311   REF   1             37,2404  53'374 1          DXCH    SKEEP3         37777, 40000
 0312   REF   1             37,2405  3 5336 1          CA      S-2
 0313   REF 193 LAST1083    37,2406  54 001 1          TS      L
 0314   REF   2 LAST1079    37,2407  3 6311 1          CA      S+3            C(A) = +3, C(L) = -2
 0315   REF   2 LAST1083    37,2410  21'374 1          DAS     SKEEP3         $ DAS ERASABLE
 0316   REF 400 LAST1083    37,2411  22 000 1          LXCH    A              $ LXCH SC
 0317   REF   2 LAST1083    37,2412  0 2047 0          IC      +0CHK
 0318   REF 194 LAST1083    37,2413  3 0001 0          CA      L
 0319   REF   8 LAST1083    37,2414  0 2055 0          IC      +1CHK
 0320                       37,2415  0 0006 1          EXTEND
 0321   REF   3 LAST1083    37,2416  3 1374 0          DCA     SKEEP3         $ DCA ERASABLE
 0322   REF 401 LAST1083    37,2417  22 000 1          LXCH    A              C(A) = -1, C(L) = +1
 0323   REF   8 LAST1083    37,2420  0 2056 0          IC      -1CHK
 0324   REF 195 LAST1083    37,2421  3 0001 0          CA      L
 0325   REF   9 LAST1083    37,2422  0 2055 0          IC      +1CHK
R0326   INCRCHK CHECKS ALL INCR PULSES EXCEPT WOVR,
 0327   REF   1             37,2423  25'374 0  INCRCHK  INCR    SKEEP4         $ INCR ERASABLE, -0
 0328   REF   2 LAST1083    37,2424  6 1374 0          AD      SKEEP4         $ AD ERASABLE
 0329   REF   3 LAST1083    37,2425  0 2050 0          IC      -0CHK
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0330   REF 402 LAST1083    37,2426   24 000 1          INCR   A          $ INCR SC, +1
0331   REF  10 LAST1083    37,2427   0 2055 0          TC     +1CHK
R0332  DAS WITH OVERFLOW IN LOW ORDER AND NET UNDERFLOW
0333                       37,2430   0 0006 1  DAS-+   EXTEND
0334   REF   8 LAST1083    37,2431   4 3506 0          DCS    S+MAX      $ DCS FIXED MEMORY
0335   REF  19 LAST1083    37,2432   53'372 1          DXCH   SKEEP1     40000, 37777
0336   REF   3 LAST1083    37,2433   3 6311 1          CA     S+3        +3
0337   REF 196 LAST1083    37,2434   54 001 1          TS     L
0338   REF 403 LAST1084    37,2435   4 0000 0          CS     A          -3
0339   REF  20 LAST1084    37,2436   21'372 1          DAS    SKEEP1     $
0340   REF   9 LAST1083    37,2437   0 2056 0          TC     -1CHK
0341                       37,2440   0 0006 1          EXTEND
0342   REF  21 LAST1084    37,2441   4 1372 1          DCS    SKEEP1     $ DCS ERASABLE (+1, -2)
0343   REF 197 LAST1084    37,2442   56 001 0          XCH    L          $ XCH SC (-2, +1)
0344   REF   6 LAST1083    37,2443   6 7763 1          AD     S+1
0345   REF  10 LAST1084    37,2444   0 2056 0          TC     -1CHK
0346   REF 198 LAST1084    37,2445   3 0001 0          CA     L
0347   REF  11 LAST1084    37,2446   0 2055 0          TC     +1CHK

R0348  MPCHK CHECKS ALL PULSES OF MP, AUG, AND ADS.
0349   REF   7 LAST1084    37,2447   3 7763 1  MPCHK   CA     S+1
0350                       37,2450   0 0006 1          EXTEND
0351   REF 404 LAST1084    37,2451   24 000 1          AUG    A          $ AUG SC, +2
0352   REF   2 LAST1078    37,2452   55'375 0          IS     SKEEP5     +2
0353   REF 405 LAST1084    37,2453   4 0000 0          CS     A
0354   REF 343 LAST1079    37,2454   54 002 1          TS     Q          -2
0355   REF 406 LAST1084    37,2455   4 0000 0          CS     A
0356                       37,2456   0 0006 1  MP++    EXTEND
0357   REF   9 LAST1084    37,2457   7 3505 0          MP     S+MAX      $ MP FIXED MEMORY, +1, 37776
0358   REF 199 LAST1084    37,2460   6 0001 0          AD     L          37777
0359                       37,2461   0 0006 1  MP+-    EXTEND
0360   REF 344 LAST1084    37,2462   7 0002 1          MP     Q          $ MP SC, -1, 40001
0361   REF 200 LAST1084    37,2463   26 001 1          ADS    L          $ ADS SC, 40000
0362   REF   1             37,2464   6 2013 1          AD     DVCON
0363   REF  11 LAST1084    37,2465   0 2056 0          TC     -1CHK
0364   REF 201 LAST1084    37,2466   3 0001 0          CA     L
0365                       37,2467   0 0006 1  MP-+    EXTEND
0366   REF   3 LAST1084    37,2470   7 1375 0          MP     SKEEP5     $ MP ERASABLE, -1, 40001
0367   REF   4 LAST1081    37,2471   55'376 0          IS     SKEEP6
0368                       37,2472   0 0006 1          EXTEND
0369   REF   5 LAST1084    37,2473   25'376 1          AUG    SKEEP6     $ AUG ERASABLE, -2
0370   REF 202 LAST1084    37,2474   6 0001 0          AD     L          40000
0371                       37,2475   0 0006 1  MP--    EXTEND
0372   REF   6 LAST1084    37,2476   7 1376 0          MP     SKEEP6     $ +1, 37776
0373   REF  12 LAST1084    37,2477   0 2055 0          TC     +1CHK
0374   REF 203 LAST1084    37,2500   4 0001 1          CS     L          40001
0375   REF   2 LAST1084    37,2501   6 2013 1          AD     DVCON
0376   REF   4 LAST1083    37,2502   0 2050 0          TC     -0CHK
0377   REF   8 LAST1084    37,2503   3 7763 1          CA     S+1
0378   REF   7 LAST1084    37,2504   27'376 0          ADS    SKEEP6     $ ADS ERASABLE, +1
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0379   REF  12 LAST1084     37,2505  0 2056 0            IC      -1CHK
0380   REF   8 LAST1084     37,2506  3 1376 1            CA      SKEEP6
0381   REF  13 LAST1085     37,2507  0 2056 0            IC      -1CHK

R0382  DVCH AND DVQXCHK CHECK ALL OF PULSES OF DV AND QXCH.
R0383  ALSO CHECKS TS WITH UNDERFLOW
0384   REF   1              37,2510  3 7746 0  DVCHK     CA      SBI114      20000
0385   REF  22 LAST1084     37,2511  55'371 1            TS      SKEEP1
0386   REF 407 LAST1084     37,2512  6 0000 1            AD      A           OVERFLOW
0387   REF   9 LAST1084     37,2513  6 7763 1            AD      S+1
0388   REF 204 LAST1084     37,2514  54 001 1            TS      L           $ TS SC WITH OVERFLOW, +1
0389   REF  37 LAST1082     37,2515  0 2033 0            IC      ERRORS
0390   REF 408 LAST1085     37,2516  4 0000 0            CS      A
0391   REF   6 LAST1083     37,2517  55'372 1            TS      SKEEP2      -1
0392   REF   1              37,2520  3 7770 0            CA      S-ZERO      -0
0393   REF  23 LAST1085     37,2521  23'371 0            LXCH    SKEEP1      $ LXCH ERASABLE
0394                        37,2522  0 0006 1  DV++      EXTEND
0395   REF  24 LAST1085     37,2523  11'371 1            DV      SKEEP1      $ DV ERASABLE, C(A) = 20000, C(L) = +0
0396   REF 409 LAST1085     37,2524  4 0000 0            CS      A
0397   REF 410 LAST1085     37,2525  22 000 1            LXCH    A
0398   REF   3 LAST1083     37,2526  0 2047 0            IC      +0CHK
0399                        37,2527  0 0006 1  DV--      EXTEND
0400   REF   7 LAST1085     37,2530  11'372 1            DV      SKEEP2      $ 20000, +0
0401   REF   3 LAST1083     37,2531  55'374 1            TS      SKEEP4      20000
0402   REF 411 LAST1085     37,2532  4 0000 0            CS      A
0403   REF   4 LAST1083     37,2533  55'373 0            TS      SKEEP3      -(20000)
0404   REF   2 LAST1085     37,2534  6 7746 0            AD      SBI114
0405   REF   5 LAST1084     37,2535  0 2050 0            IC      -0CHK
0406   REF 205 LAST1085     37,2536  3 0001 0            CA      L
0407   REF   6 LAST1085     37,2537  0 2050 0            IC      -0CHK
0408   REF  10 LAST1084     37,2540  3 3505 1  DV+-      CA      S+MAX
0409   REF 206 LAST1085     37,2541  54 001 1            TS      L
0410   REF   1              37,2542  3 2010 1            CA      S13BITS
0411                        37,2543  0 0006 1            EXTEND
0412   REF   5 LAST1085     37,2544  11'373 0            DV      SKEEP3      $ -(37777), +(17777)
0413   REF 207 LAST1085     37,2545  56 001 0            XCH     L
0414   REF 412 LAST1085     37,2546  4 0000 0            CS      A
0415                        37,2547  0 0006 1  DV-+      EXTEND
0416   REF   4 LAST1085     37,2550  11'374 1            DV      SKEEP4      $ -(37777), -(17777)
0417   REF   3 LAST1084     37,2551  6 2013 1            AD      DVCON
0418   REF  14 LAST1085     37,2552  0 2056 0            IC      -1CHK
0419   REF  11 LAST1085     37,2553  3 3505 1            CA      S+MAX
0420   REF 208 LAST1085     37,2554  56 001 0            XCH     L           ALSO PUTS 37777 IN L FOR DV-+,-
0421   REF   3 LAST1085     37,2555  6 7746 0            AD      SBI114
0422   REF  13 LAST1084     37,2556  0 2055 0            IC      +1CHK
0423   REF   2 LAST1085     37,2557  4 2010 0  DV-+,+    CS      S13BITS     -(17777)
0424                        37,2560  0 0006 1            EXTEND
0425   REF   5 LAST1085     37,2561  11'374 1            DV      SKEEP4
0426   REF 209 LAST1085     37,2562  6 0001 0            AD      L           -(37775)
0427   REF   4 LAST1085     37,2563  6 2013 1            AD      DVCON
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 0428   REF  14 LAST1085     37,2564  0 2055 0            IC      +1CHK
 0429   REF 210 LAST1085     37,2565  56 001 0            XCH     L
 0430   REF  15 LAST1085     37,2566  0 2056 0            IC      -1CHK          ALSO PUTS +0 IN L FOR DVQXCH
 0431   REF   5 LAST1085     37,2567  4 2013 0  DVQXCHK    CS      DVCON
 0432   REF 345 LAST1084     37,2570  54 002 1            TS      Q              40001
 0433   REF 413 LAST1085     37,2571  4 0000 0            CS      A
 0434                        37,2572  0 0006 1            EXTEND
 0435   REF 346 LAST1086     37,2573  10 002 1            DV      Q              $ DV SC, -(37777), +(37776)
 0436                        37,2574  0 0006 1            EXTEND
 0437   REF 211 LAST1086     37,2575  22 001 0            QXCH    L              $ QXCH SC, C(L) = 40001, C(Q) = 37776
 0438   REF 347 LAST1086     37,2576  6 0002 0            AD      Q
 0439   REF  16 LAST1086     37,2577  0 2056 0            IC      -1CHK
 0440   REF 212 LAST1086     37,2600  3 0001 0            CA      L
 0441   REF  12 LAST1085     37,2601  6 3505 1            AD      S+MAX
 0442   REF  15 LAST1086     37,2602  0 2055 0            IC      +1CHK
 0443                        37,2603  0 0006 1            EXTEND
 0444   REF  25 LAST1085     37,2604  23'371 0            QXCH    SKEEP1         $ QXCH ERAS., C(Q) = +1, C(SKEEP1) = +3
 0445   REF 348 LAST1086     37,2605  3 0002 0            CA      Q
 0446   REF  16 LAST1086     37,2606  0 2055 0            IC      +1CHK
 0447   REF  26 LAST1086     37,2607  4 1371 1            CS      SKEEP1         -3
 0448   REF   4 LAST1083     37,2610  6 7762 0            AD      S+2
 0449   REF  17 LAST1086     37,2611  0 2056 0            IC      -1CHK

R0450   MSUCHK CHECKS ALL PULSES OF MSU EXCEPT RB WG.
 0451   REF   5 LAST1082     37,2612  3 7767 0  MSUCHK    CA      S+ZERO
 0452   REF  27 LAST1086     37,2613  55'371 1            TS      SKEEP1         +0
 0453   REF 414 LAST1086     37,2614  4 0000 0            CS      A
 0454   REF   8 LAST1085     37,2615  55'372 1            TS      SKEEP2         -0
 0455                        37,2616  0 0006 1            EXTEND
 0456   REF 415 LAST1086     37,2617  20 000 0            MSU     A              $ MSU SC, +0
 0457   REF   4 LAST1085     37,2620  0 2047 0            IC      +0CHK
 0458                        37,2621  0 0006 1            EXTEND
 0459   REF   9 LAST1086     37,2622  21'372 1            MSU     SKEEP2         $ MSU ERASABLE, +1
 0460   REF  17 LAST1086     37,2623  0 2055 0            IC      +1CHK
 0461                        37,2624  0 0006 1            EXTEND
 0462   REF  13 LAST1086     37,2625  3 3506 1            DCA     S+MAX
 0463                        37,2626  0 0006 1            EXTEND
 0464   REF 213 LAST1086     37,2627  20 001 1            MSU     L              $ CHECKS RUS WA, ALSO -1 FROM NEG. NO.
 0465   REF 416 LAST1086     37,2630  54 000 0            TS      A
 0466                        37,2631  0 2633 0            IC      +2
 0467   REF  38 LAST1085     37,2632  0 2033 0            IC      ERRORS
 0468   REF  18 LAST1086     37,2633  0 2056 0            IC      -1CHK

R0469   MASKCHK  FINISHES CHECKING MASK INSTRUCTION.
 0470   REF   2 LAST1079     37,2634  3 7765 1  MASKCHK   CA      S+7
 0471   REF 214 LAST1086     37,2635  54 001 1            TS      L
 0472   REF   2 LAST1078     37,2636  7 2016 0            MASK    S-7            $ MASK FIXED MEMORY
 0473   REF   5 LAST1086     37,2637  0 2047 0            IC      +0CHK
 0474   REF  10 LAST1085     37,2640  3 7763 1            CA      S+1
 0475   REF 215 LAST1086     37,2641  7 0001 1            MASK    L              $ MASK SC
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L       AGC BLOCK TWO SELF-CHECK                                        USER'S OWN PAGE NO.  13          S3  E3

 0476   REF  18 LAST1086     37,2642  0 2055 0          IC      +1CHK

R0477   NDX+SU FINISHES CHECKING BOTH INDEX INSTRUCTIONS. ALSO CHECKS ALL OF SU
R0478   EXCEPT RB WG.
 0479   REF  11 LAST1086     37,2643  3 7763 1  NDX+SU  CA      S+1
 0480   REF 216 LAST1086     37,2644  54 001 1          TS      L
 0481   REF  28 LAST1086     37,2645  55'371 1          TS      SKEEP1
 0482   REF 417 LAST1086     37,2646  50 000 1          NDX     A               $ NDX SC
 0483                        37,2647  6 0000 1          AD      0000            AD L, +2
 0484                        37,2650  0 0006 1          EXTEND
 0485   REF  29 LAST1087     37,2651  61'371 0          SU      SKEEP1          $ SU ERASABLE
 0486   REF  19 LAST1087     37,2652  0 2055 0          IC      +1CHK
 0487                        37,2653  0 0006 1          EXTEND
 0488   REF 217 LAST1087     37,2654  5 0001 0          NDX     L               $ NDX SC
 0489                        37,2655  60 000 1          SU      0000            $ SU SC, SU L
 0490   REF  19 LAST1086     37,2656  0 2056 0          IC      -1CHK

R0491   D--SC CHECKS DCS SC, DXCH SC, AND DCA SC.
 0492   REF   5 LAST1086     37,2657  3 7762 0  D--SC   CA      S+2
 0493   REF 218 LAST1087     37,2660  54 001 1          TS      L               +2
 0494   REF  12 LAST1087     37,2661  3 7763 1          CA      S+1
 0495                        37,2662  0 0006 1          EXTEND
 0496   REF 418 LAST1087     37,2663  4 0001 1          DCS     A               $ DCS SC, C(L) = -2
 0497   REF  20 LAST1087     37,2664  0 2056 0          IC      -1CHK
R0498   AFTER DXCH C(A) = B(Q) = +3, C(L) = B(A) = +0, C(Q) = B(L) = -1.
 0499   REF 219 LAST1087     37,2665  52 002 1          DXCH    L               $ DXCH SC
 0500   REF   6 LAST1085     37,2666  55'373 0          TS      SKEEP3
 0501   REF 349 LAST1086     37,2667  6 0002 0          AD      Q
 0502   REF  20 LAST1087     37,2670  0 2055 0          IC      +1CHK
 0503   REF 220 LAST1087     37,2671  3 0001 0          CA      L
 0504   REF   6 LAST1086     37,2672  0 2047 0          IC      +0CHK
 0505   REF   3 LAST1083     37,2673  3 7771 1          CA      S-1
 0506   REF 350 LAST1087     37,2674  54 002 1          TS      Q
 0507   REF 419 LAST1087     37,2675  4 0000 0          CS      A
 0508                        37,2676  0 0006 1          EXTEND
R0509   AFTER DCA C(A) = C(L) = C(Q) = B(Q) = -1.
 0510   REF 221 LAST1087     37,2677  3 0002 0          DCA     L               $ DCA SC
 0511   REF 351 LAST1087     37,2700  6 0002 0          AD      Q
 0512   REF   7 LAST1087     37,2701  6 1373 1          AD      SKEEP3
 0513   REF  21 LAST1087     37,2702  0 2055 0          IC      +1CHK
 0514   REF 222 LAST1087     37,2703  3 0001 0          CA      L
 0515   REF  21 LAST1087     37,2704  0 2056 0          IC      -1CHK

R0516   D--LCHK CHECKS THAT OVERFLOW IS LOST IN PROCESS OF GOING THROUGH L REG.
R0517   ALSO CHECKS THAT Q WILL HOLD 16 BITS
 0518   REF   2 LAST1083     37,2705  3 5336 1  D--LCHK  CA      S-2
 0519   REF 352 LAST1087     37,2706  54 002 1          TS      Q
 0520   REF   1              37,2707  3 3506 1          CA      S-MAX
 0521   REF 353 LAST1087     37,2710  26 002 1          ADS     Q
 0522   REF 354 LAST1087     37,2711  4 0002 1          CS      Q
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 0523   REF 420 LAST1087    37,2712  54 000 0            IS      A
 0524   REF  39 LAST1086    37,2713  0 2033 0            TC      ERRORS
 0525                       37,2714  0 0006 1            EXTEND
 0526   REF 223 LAST1087    37,2715  3 0002 0            DCA     L
 0527   REF 421 LAST1088    37,2716  54 000 0            IS      A
 0528                       37,2717  0 2721 1            TC      +2
 0529   REF  40 LAST1088    37,2720  0 2033 0            TC      ERRORS
 0530   REF  22 LAST1087    37,2721  0 2056 0            TC      -1CHK

R0531   CHECKS OVERFLOW, UNDERFLOW,END-AROUND-CARRY, AND SIGN CHANGE OF ADDER.
R0532   ALSO CHECKS ADS SC WITH OVERFLOW AND TS A WITH UNDERFLOW
 0533   REF   4 LAST1085    37,2722  3 7746 0  ADDRCHK   CA      SBIT14          20000
 0534   REF 355 LAST1087    37,2723  54 002 1            IS      Q
 0535   REF 356 LAST1088    37,2724  26 002 1            ADS     Q               $ ADS SC, OVERFLOW
 0536   REF 357 LAST1088    37,2725  26 002 1            ADS     Q               UNDERFLOW
 0537   REF 422 LAST1088    37,2726  54 000 0            IS      A               $ TS SC WITH UNDERFLOW
 0538   REF  41 LAST1088    37,2727  0 2033 0            TC      ERRORS
 0539   REF 358 LAST1088    37,2730  26 002 1            ADS     Q
 0540   REF  22 LAST1087    37,2731  0 2055 0            TC      +1CHK

R0541   RUPTCHK CHECKS THAT INTERRUPT DOES NOT OCCUR WHILE OVERFLOW OR UNDERFLOW
R0542   IS IN THE A REGISTER. ALSO CHECKS THAT INHINT RELINT WORK PROPERLY.
 0543                       37,2732  0 0004 0  RUPTCHK   INHINT
 0544   REF   6 LAST1086    37,2733  3 7767 0            CA      S+ZERO
 0545   REF   1             37,2734  54 015 1            IS      ZRUPT
 0546                       37,2735  0 0003 1            RELINT
 0547   REF   4 LAST 107    37,2736  6 0027 1            AD      TIME4
 0548   REF  30 LAST1087    37,2737  55'371 1            IS      SKEEP1
 0549   REF  31 LAST1088    37,2740  4 1371 1  TENMS     CS      SKEEP1
 0550   REF   5 LAST1088    37,2741  6 0027 1            AD      TIME4           WAIT FOR NEXT TIME4 INCREMENT
 0551                       37,2742  0 0006 1            EXTEND
 0552   REF   1             37,2743  1 2740 1            BZF     TENMS
 0553                       37,2744  0 0004 0            INHINT
 0554   REF   2 LAST1088    37,2745  3 0015 0            CA      ZRUPT
 0555                       37,2746  0 0006 1            EXTEND
 0556                       37,2747  1 2751 1            BZF     +2              NO INTERRUPT.
 0557   REF   1             37,2750  0 2732 0            TC      RUPTCHK         THERE WAS AN INTERRUPT. START AGAIN.
 0558   REF  13 LAST1087    37,2751  3 7763 1            CAF     S+1             2 1/2 MS UNTILE NEXT T3 INTERRUPT.
 0559   REF 128 LAST1074    37,2752  0 5663 1            TC      WAITLIST
 0560   REF  67 LAST1077                E3              EBANK=  LST1
 0561                       37,2753   02776 0           2CADR   TSKADRS
C0561   REF   1             37,2754   76063 0
 0562   REF  14 LAST1086    37,2755  3 3505 1            CA      S+MAX
 0563   REF   1             37,2756  6 2012 0            AD      OVCON           CONTROLS TIME SPENT IN OF-UF LOOP
 0564                       37,2757  0 0003 1            RELINT
 0565   REF 423 LAST1088    37,2760  4 0000 0  WAIT      CS      A
 0566   REF 424 LAST1088    37,2761  10 000 0            CCS     A
 0567   REF   1             37,2762  0 2766 1            TC      INHNTCHK
 0568   REF   1             37,2763   02772 1  RUPTCON   ADRES   C(BRUPT)
 0569   REF   6 LAST1087    37,2764  6 7762 0            AD      S+2
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0570   REF   1              37,2765  0 2760 1                 IC      WAIT
0571                        37,2766  0 0004 0  INHNTCHK       INHINT                  T3 RUPT SHOULD BE WAITING
0572   REF   4 LAST1084     37,2767  55'375 0                 IS      SKEEP5
0573   REF  42 LAST1088     37,2770  0 2033 0                 IC      ERRORS
0574                        37,2771  0 0003 1                 RELINT
0575   REF   3 LAST1088     37,2772  4 0015 1  C(BRUPT)      CS      ZRUPT           INTERRUPT SHOULD HAPPEN HERE
0576                        37,2773  0 0006 1                 EXTEND
0577                        37,2774  1 3002 1                 BZF     +6              MAKES SURE AN INTERRUPT DID OCCUR
0578   REF   2 LAST1079     37,2775  0 3003 1                 IC      IN-OUT1         AN INTERRUPT. END OF RUPTCHK
0579   REF   4 LAST1089     37,2776  4 0015 1  TSKADRS       CS      ZRUPT
0580   REF   1              37,2777  6 2763 1                 AD      RUPTCON
0581   REF  23 LAST1088     37,3000  0 2056 0                 IC      -1CHK
0582   REF 125 LAST1074     37,3001  0 5727 0                 IC      TASKOVER
05825  REF  43 LAST1089     37,3002  0 2033 0                 IC      ERRORS          NO INTERRUPT

R0583  IN-OUT1 CHECKS ALL PULSES OF WRITE AND READ
0584   REF   4 LAST1087     37,3003  3 7771 1  IN-OUT1       CA      S-1
0585                        37,3004  0 0006 1  WRITECHK      EXTEND
0586   REF 359 LAST1088     37,3005  01 002 1                 WRITE   Q
0587   REF 360 LAST1089     37,3006  22 002 0                 LXCH    Q               PUT C(Q) IN L
0588   REF  24 LAST1089     37,3007  0 2056 0                 IC      -1CHK
0589                        37,3010  0 0006 1  READCHK       EXTEND                  C(L) = 77776
0590   REF 224 LAST1088     37,3011  00 001 0                 READ    L
0591   REF  25 LAST1089     37,3012  0 2056 0                 IC      -1CHK
0592   REF 225 LAST1089     37,3013  3 0001 0                 CA      L
0593   REF  26 LAST1089     37,3014  0 2056 0                 IC      -1CHK

R0594  IN-OUT2 CHECKS ALL PULSES OF ROR AND WOR
0595   REF   4 LAST1084     37,3015  4 6311 0  IN-OUT2       CS      S+3
0596   REF 226 LAST1089     37,3016  54 001 1  RORCHK        IS      L               77774
0597   REF   6 LAST1086     37,3017  3 2013 1                 CA      DVCON           37776
0598                        37,3020  0 0006 1                 EXTEND
0599   REF 227 LAST1089     37,3021  04 001 1                 ROR     L               $ ROR, -1
0600   REF  27 LAST1089     37,3022  0 2056 0                 IC      -1CHK
0601   REF   7 LAST1089     37,3023  3 2013 1  WORCHK        CA      DVCON           C(L) STILL 77774
0602                        37,3024  0 0006 1                 EXTEND
0603   REF 228 LAST1089     37,3025  05 001 0                 WOR     L               $ WOR, -1
0604   REF  28 LAST1089     37,3026  0 2056 0                 IC      -1CHK
0605   REF 229 LAST1089     37,3027  3 0001 0                 CA      L
0606   REF  29 LAST1089     37,3030  0 2056 0                 IC      -1CHK

R0607  IN-OUT3 CHECKS ALL PULSES OF RAND, WAND, AND RXOR
0608   REF   8 LAST1089     37,3031  4 2013 0  IN-OUT3       CS      DVCON
0609   REF 230 LAST1089     37,3032  54 001 1  RANDCHK       IS      L               40001
0610   REF   3 LAST1085     37,3033  3 2010 1                 CA      S13BITS         17777
0611                        37,3034  0 0006 1                 EXTEND
0612   REF 231 LAST1089     37,3035  02 001 1                 RAND    L               $ RAND, +1
0613   REF  23 LAST1088     37,3036  0 2055 0                 IC      +1CHK
0614   REF   4 LAST1089     37,3037  3 2010 1  WANDCHK       CA      S13BITS         C(L) STILL 40001
0615                        37,3040  0 0006 1                 EXTEND
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0616   REF 232 LAST1089     37,3041  03 001 0            WAND    L          $ WAND, +1
0617   REF  24 LAST1089     37,3042  0 2055 0            TC      +1CHK
0618   REF   2 LAST1082     37,3043  4 7766 0            CS      S+5
0619   REF 233 LAST1090     37,3044  56 001 0            XCH     L          ALSO PUT -5 IN L FOR RXORCHK
0620   REF  25 LAST1090     37,3045  0 2055 0            TC      +1CHK
0621   REF   1              37,3046  3 6306 1  RXORCHK   CA      S+6
0622                        37,3047  0 0006 1            EXTEND
0623   REF 234 LAST1090     37,3050  06 001 0            RXOR    L          $ RXOR, -3
0624   REF   7 LAST1088     37,3051  6 7762 0            AD      S+2
0625   REF  30 LAST1089     37,3052  0 2056 0            TC      -1CHK
0626   REF 235 LAST1090     37,3053  3 0001 0            CA      L
0627   REF   1              37,3054  6 7761 0            AD      S+4
0628   REF  31 LAST1090     37,3055  0 2056 0            TC      -1CHK

0629   REF   3 LAST1079     37,3056  0 2064 1            TC      SMODECHK

R0630  COUNTCHK COUNTS UP 14 BIT NUMBER WITH SIGN.
R0631  TAKES APPROXIMATELY 8.7 SECONDS.
R0632  ** PUT IN CCS NEWJOB FOR ROPE.
0633                        37,3057  0 0006 1  COUNTCHK EXTEND
0634   REF  15 LAST1088     37,3060  3 3506 1            DCA     S+MAX
0635   REF   9 LAST1085     37,3061  53'377 1            DXCH    SKEEP6     PUT 37777 IN SKEEP6 AND 40000 IN SKEEP7
0636   REF  10 LAST1090     37,3062  3 1376 1  +LOOP     CA      SKEEP6
0637   REF 361 LAST1089     37,3063  56 002 0            XCH     Q
0638                        37,3064  0 0006 1            EXTEND
0639   REF 236 LAST1090     37,3065  4 0002 1            DCS     L
0640   REF 425 LAST1088     37,3066  10 000 0            CCS     A
0641   REF   1              37,3067  0 3076 0            TC      -NMBR
0642   REF   1              37,3070  0 3103 0            TC      ENDCOUNT
0643   REF  11 LAST1090     37,3071  55'376 0            TS      SKEEP6
0644   REF   5 LAST1080     37,3072  6 1377 0            AD      SKEEP7
0645   REF  32 LAST1090     37,3073  0 2056 0            TC      -1CHK
0646   REF   6 LAST1090     37,3074  25'377 0            INCR    SKEEP7
0647   REF   1              37,3075  0 3062 0            TC      +LOOP
0648   REF 237 LAST1090     37,3076  6 0001 0  -NMBR     AD      L
0649   REF  33 LAST1090     37,3077  0 2056 0            TC      -1CHK
0650   REF   3 LAST1078     37,3100  0 5605 1            TC      CHECKNJ    CHECK FOR NEW JOB
0651   REF  12 LAST1090     37,3101  4 1376 0            CS      SKEEP6
0652   REF   2 LAST1090     37,3102  0 3063 1            TC      +LOOP +1
0653   REF   7 LAST1090     37,3103  3 1377 0  ENDCOUNT  CA      SKEEP7     -0
0654   REF  13 LAST1090     37,3104  6 1376 1            AD      SKEEP6     SKEEP6 SHOULD BE +0
0655   REF   7 LAST1085     37,3105  0 2050 0            TC      -0CHK

R0656  O-UFLOW COUNTS DOWN OVERFLOW AND UNDERFLOW NUMBERS.
R0657  TAKES APPROXIMATELY 10.8 SECONDS
0658   REF   2 LAST1087     37,3106  3 3506 1  O-UFLOW   CA      S-MAX
0659   REF   5 LAST1089     37,3107  55'375 0            TS      SKEEP5     40000
0660   REF 426 LAST1090     37,3110  4 0000 0            CS      A
0661                        37,3111  0 0004 0  OFLOOP     INHINT
0662   REF  16 LAST1090     37,3112  6 3505 1            AD      S+MAX
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L       AGC BLOCK TWO SELF-CHECK                                        USER'S OWN PAGE NO.  17          S3  E3

 0663   REF  14 LAST1088     37,3113   6 7763 1            AD      S+1
 0664   REF 362 LAST1090     37,3114   56 002 0            XCH     Q
 0665   REF 363 LAST1091     37,3115   10 002 1            CCS     Q
 0666   REF   1              37,3116   0 3133 0            TC      -NMBRS
 0667   REF  44 LAST1089     37,3117   0 2033 0            TC      ERRORS          CAN PUT IN CONSTANT
 0668   REF   8 LAST1087     37,3120   55'373 0            IS      SKEEP3
 0669   REF  45 LAST1091     37,3121   0 2033 0            TC      ERRORS
 0670   REF   9 LAST1091     37,3122   3 1373 1            CA      SKEEP3
 0671   REF   6 LAST1090     37,3123   6 1375 1            AD      SKEEP5
 0672   REF  34 LAST1090     37,3124   0 2056 0            TC      -1CHK
 0673                        37,3125   0 0003 1            RELINT
 0674   REF   4 LAST1090     37,3126   0 5605 1            TC      CHECKNJ         CHECK FOR NEW JOB
 0675   REF   6 LAST1085     37,3127   3 1374 0            CA      SKEEP4
 0676                        37,3130   0 0006 1            EXTEND
 0677   REF   7 LAST1091     37,3131   27'375 0            DIM     SKEEP5
 0678   REF   1              37,3132   0 3111 0            TC      OFLOOP
 0679   REF   7 LAST1091     37,3133   55'374 1  -NMBRS    IS      SKEEP4
 0680   REF   1              37,3134   0 3144 0            TC      ENDOFUF
 0681   REF   8 LAST1091     37,3135   3 1374 0            CA      SKEEP4
 0682   REF   8 LAST1091     37,3136   6 1375 1            AD      SKEEP5
 0683   REF  35 LAST1091     37,3137   0 2056 0            TC      -1CHK
 0684   REF   9 LAST1091     37,3140   3 1375 1            CA      SKEEP5
 0685   REF   3 LAST1090     37,3141   6 3506 1            AD      S-MAX
 0686   REF   5 LAST1089     37,3142   6 7771 1            AD      S-1
 0687   REF   2 LAST1091     37,3143   0 3114 0            TC      OFLOOP +3
 0688   REF  10 LAST1091     37,3144   3 1375 1  ENDOFUF   CA      SKEEP5
 0689   REF   8 LAST1090     37,3145   0 2050 0            TC      -0CHK
 0690   REF   9 LAST1091     37,3146   4 1374 1            CS      SKEEP4
 0691   REF   9 LAST1089     37,3147   6 2013 1            AD      DVCON
 0692   REF  36 LAST1091     37,3150   0 2056 0            TC      -1CHK
 0693                        37,3151   0 0003 1            RELINT

 0694   REF   4 LAST1090     37,3152   0 2064 1            TC      SMODECHK

R0695   SKEEP7 HOLDS LOWEST OF TWO ADDRESSES BEING CHECKED.
R0696   SKEEP6 HOLDS B(X+1).
R0697   SKEEP5 HOLDS B(X).
R0698   SKEEP4 CONTROLS CHECKING OF NON-SWITCHABLE ERASABLE MEMORY WITH
R0699   BANK NUMBERS IN EB.
R0700   SKEEP3 HOLDS LAST ADDRESS BEING CHECKED (HIGHEST ADDRESS).
R0701   SKEEP2 HOLDS C(EBANK) DURING CHECKNJ
R0702   ERASCHK TAKES APPROXMATELY 7 SECONDS
 0703   REF  15 LAST1091     37,3153   3 7763 1  ERASCHK   CA      S+1
 0704   REF  10 LAST1091     37,3154   55'374 1            IS      SKEEP4
 0705   REF   7 LAST1088     37,3155   3 7767 0  OEBANK    CA      S+ZERO
 0706   REF  72 LAST1040     37,3156   54 003 0            IS      EBANK
 0707   REF   1              37,3157   3 2004 1            CA      ERASCON3        01401
 0708   REF   8 LAST1090     37,3160   55'377 1            IS      SKEEP7          STARTING ADDRESS
 0709   REF   1              37,3161   3 5337 0            CA      S10BITS         01777
 0710   REF  10 LAST1091     37,3162   55'373 0            IS      SKEEP3          LAST ADDRESS CHECKED
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0711  REF   1                 37,3163  0 3203 0            IC      ERASLOOP

0712  REF   1                 37,3164  3 2003 0  E13456/B  CA      ERASCON6    01400
0713  REF   9 LAST1091        37,3165  55'377 1            IS      SKEEP7      STARTING ADDRESS
0714  REF   2 LAST1091        37,3166  3 5337 0            CA      SIOBITS     01777
0715  REF  11 LAST1091        37,3167  55'373 0            IS      SKEEP3      LAST ADDRESS CHECKED
0716  REF   2 LAST1092        37,3170  0 3203 0            IC      ERASLOOP

0717  REF   2 LAST1092        37,3171  3 2003 0  2EBANK    CA      ERASCON6    01400
0718  REF  10 LAST1092        37,3172  55'377 1            IS      SKEEP7      STARTING ADDRESS
0719  REF   1                 37,3173  3 2005 0            CA      ERASCON4    01774
0720  REF  12 LAST1092        37,3174  55'373 0            IS      SKEEP3      LAST ADDRESS CHECKED
0721  REF   3 LAST1092        37,3175  0 3203 0            IC      ERASLOOP

0722  REF  11 LAST1091        37,3176  55'374 1  NOEBANK   IS      SKEEP4      +0
0723  REF   1                 37,3177  3 2001 1            CA      ERASCON1    00001
0724  REF  11 LAST1092        37,3200  55'377 1            IS      SKEEP7      STARTING ADDRESS
0725  REF   1                 37,3201  3 2002 1            CA      ERASCON2    01374
0726  REF  13 LAST1092        37,3202  55'373 0            IS      SKEEP3      LAST ADDRESS CHECKED

0727                          37,3203  0 0004 0  ERASLOOP  INHINT
0728                          37,3204  0 0006 1            EXTEND
0729  REF  12 LAST1092        37,3205  5 1377 0            NDX     SKEEP7
0730                          37,3206  3 0001 0            DCA     0000
0731  REF  11 LAST1091        37,3207  53'376 0            DXCH    SKEEP5      STORES C(X) AND C(X+1) IN SKEEP6 AND 5.
0732  REF  13 LAST1092        37,3210  3 1377 0            CA      SKEEP7
0733  REF   5 LAST1078        37,3211  55'353 1            IS      ERESTORE    IF RESTART, RESTORE C(X) AND C(X+1)
0734  REF 238 LAST1090        37,3212  54 001 1            IS      L
0735  REF 239 LAST1092        37,3213  24 001 0            INCR    L
0736  REF 427 LAST1090        37,3214  50 000 1            NDX     A
0737                          37,3215  52 001 1            DXCH    0000        PUTS OWN ADDRESS IN X AND X +1
0738  REF  14 LAST1092        37,3216  51'377 0            NDX     SKEEP7
0739                          37,3217  4 0001 1            CS      0001        CS  X+1
0740  REF  15 LAST1092        37,3220  51'377 0            NDX     SKEEP7
0741                          37,3221  6 0000 1            AD      0000        AD X
0742  REF  37 LAST1091        37,3222  0 2056 0            TC      -1CHK
07421 REF   6 LAST1092        37,3223  3 1353 0            CA      ERESTORE    HAS ERASABLE BEEN RESTORED
07422                         37,3224  0 0006 1            EXTEND
07423 REF   1                 37,3225  1 3251 0            BZF     ELOOPFIN    YES, EXIT ERASLOOP.
0743                          37,3226  0 0006 1            EXTEND
0744  REF  16 LAST1092        37,3227  5 1377 0            NDX     SKEEP7
0745                          37,3230  4 0001 1            DCS     0000        COMPLEMENT OF ADDRESS OF X AND X+1
0746  REF  17 LAST1092        37,3231  51'377 0            NDX     SKEEP7
0747                          37,3232  52 001 1            DXCH    0000        PUT COMPLEMENT OF ADDRESS OF X AND X+1
0748  REF  18 LAST1092        37,3233  51'377 0            NDX     SKEEP7
0749                          37,3234  4 0000 0            CS      0000        CS  X
0750  REF  19 LAST1092        37,3235  51'377 0            NDX     SKEEP7
0751                          37,3236  6 0001 0            AD      0001        AD X+1
0752  REF  38 LAST1092        37,3237  0 2056 0            TC      -1CHK
07521 REF   7 LAST1092        37,3240  3 1353 0            CA      ERESTORE    HAS ERASABLE BEEN RESTORED
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 07522                          37,3241  0 0006 1           EXTEND
 07523  REF   2 LAST1092        37,3242  1 3251 0           BZF     ELOOPFIN        YES, EXIT ERASLOOP.
 0753                           37,3243  0 0006 1           EXTEND
 0754   REF  12 LAST1092        37,3244  3 1376 1           DCA     SKEEP5
 0755   REF  20 LAST1092        37,3245  51'377 0           NDX     SKEEP7
 0756                           37,3246  52 001 1           DXCH    0000            PUT B(X) AND B(X+1) BACK INTO X AND X+1
 0757   REF   8 LAST1091        37,3247  3 7767 0           CA      S+ZERO
 0758   REF   8 LAST1092        37,3250  55'353 1           TS      ERESTORE        IF RESTART, DO NOT RESTORE C(X), C(X+1)
 0759                           37,3251  0 0003 1  ELOOPFIN RELINT
 0760   REF  73 LAST1091        37,3252  3 0003 1           CA      EBANK           STORES C(EBANK)
 0761   REF  10 LAST1086        37,3253  55'372 1           TS      SKEEP2
 0762   REF   5 LAST1091        37,3254  0 5605 1           TC      CHECKNJ         CHECK FOR NEW JOB
 0763   REF  11 LAST1093        37,3255  3 1372 0           CA      SKEEP2          REPLACES B(EBANK)
 0764   REF  74 LAST1093        37,3256  54 003 0           TS      EBANK
 0765   REF  21 LAST1093        37,3257  25'377 0           INCR    SKEEP7
 0766   REF  22 LAST1093        37,3260  4 1377 1           CS      SKEEP7
 0767   REF  14 LAST1092        37,3261  6 1373 1           AD      SKEEP3
 0768                           37,3262  0 0006 1           EXTEND
 0769                           37,3263  1 3265 1           BZF     +2
 0770   REF   4 LAST1092        37,3264  0 3203 0           TC      ERASLOOP        GO TO NEXT ADDRESS IN SAME BANK
 0771   REF  12 LAST1092        37,3265  11'374 1           CCS     SKEEP4
 0772   REF   1                 37,3266  0 3176 1           TC      NOEBANK
 0773   REF  13 LAST1093        37,3267  25'374 0           INCR    SKEEP4          PUT +1 IN SKEEP4
 0774   REF  75 LAST1093        37,3270  3 0003 1           CA      EBANK
 0775   REF   2 LAST1080        37,3271  6 7753 1           AD      SBIT9
 0776   REF  76 LAST1093        37,3272  54 003 0           TS      EBANK
 0777   REF   1                 37,3273  6 2015 1           AD      ERASCON5        76777, CHECK FOR BANK E2
 0778                           37,3274  0 0006 1           EXTEND
 0779   REF   1                 37,3275  1 3171 1           BZF     2EBANK
 0780   REF  77 LAST1093        37,3276  10 003 0           CCS     EBANK
 0781   REF   1                 37,3277  0 3164 1           TC      E134567B        GO TO EBANKS 1,3,4,5,6, AND 7
 0782   REF   3 LAST1092        37,3300  3 2003 0           CA      ERASCON6        END OF ERASCHK
 0783   REF  78 LAST1093        37,3301  54 003 0           TS      EBANK
R0784   CNTRCHK PERFORMS A CS OF ALL REGISTERS FROM OCT. 60 THROUGH OCT. 10.
R0785   INCLUDED ARE ALL COUNTERS, T6-1, CYCLE AND SHIFT, AND ALL RUPT REGISTERS
 0786   REF   1                 37,3302  3 2000 0  CNTRCHK  CA      CNTRCON         00050
 0787   REF  12 LAST1093        37,3303  55'372 1  CNTRLOOP TS      SKEEP2
 0788   REF   1                 37,3304  6 7760 1           AD      SBIT4           +10 OCTAL
 0789   REF 428 LAST1092        37,3305  50 000 1           INDEX   A
 0790                           37,3306  4 0000 0           CS      0000
 0791   REF  13 LAST1093        37,3307  11'374 1           CCS     SKEEP2
 0792   REF   1                 37,3310  0 3303 1           TC      CNTRLOOP

R0793   CYCLSHFT CHECKS THE CYCLE AND SHIFT REGISTERS
 0794   REF   1                 37,3311  3 2011 0  CYCLSHFT CA      CONC+S1         25252
 0795   REF  48 LAST1042        37,3312  54 020 1           TS      CYR             C(CYR) = 12525
 0796   REF  21 LAST1031        37,3313  54 022 0           TS      CYL             C(CYL) = 52524
 0797   REF  50 LAST1081        37,3314  54 021 0           TS      SR              C(SR) = 12525
 0798   REF   6 LAST 954        37,3315  54 023 1           TS      EDOP            C(EDOP) = 00125
 0799   REF  49 LAST1093        37,3316  6 0020 0           AD      CYR             37777          C(CYR) = 45252
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 0800   REF  22 LAST1093     37,3317  6 0022 1          AD     CYL          00-12524      C(CYL) = 25251
 0801   REF  51 LAST1093     37,3320  6 0021 1          AD     SR           00-25251      C(SR) = 05252
 0802   REF   7 LAST1093     37,3321  6 0023 0          AD     EDOP         00-25376      C(EDOP) = +0
 0803   REF   1              37,3322  6 2014 0          AD     CONC+52    C(CONC+52) = 52400
 0804   REF  39 LAST1092     37,3323  0 2056 0          TC     =1CHK
 0805   REF  50 LAST1093     37,3324  6 0020 0          AD     CYR          45252
 0806   REF  23 LAST1094     37,3325  6 0022 1          AD     CYL          72543
 0807   REF  52 LAST1094     37,3326  6 0021 1          AD     SR           77775
 0808   REF   8 LAST1094     37,3327  6 0023 0          AD     EDOP         77775
 0809   REF  16 LAST1091     37,3330  6 7763 1          AD     S+1          77776
 0810   REF  40 LAST1094     37,3331  0 2056 0          TC     =1CHK

 0811   REF   3 LAST1079     37,3332  25'367 1          INCR   SCOUNT +1
 0812   REF   5 LAST1091     37,3333  0 2064 1          TC     SMODECHK
 0813   REF   2 LAST1079     37,3334  0 3340 0          TC     ROPECHK

R0814   SKEEP1 HOLDS SUM
R0815   SKEEP2 HOLDS PRESENT CONTENTS OF ADDRESS IN ROPECHK AND SHOWSUM ROUTINES
R0816   SKEEP2 HOLDS BANK NUMBER IN LOW ORDER BITS DURING SHOWSUM DISPLAY
R0817   SKEEP3 HOLDS PRESENT ADDRESS (00000 TO 01777 IN COMMON FIXED BANKS)
R0818                                (04000 TO 07777 IN FXFX BANKS)
R0819   SKEEP3 HOLDS BUGGER WORD DURING SHOWSUM DISPLAY
R0820   SKEEP4 HOLDS BANK NUMBER AND SUPER BANK NUMBER
R0821   SKEEP5 COUNTS 2 SUCCESSIVE TC SELF WORDS
R0822   SKEEP6 CONTROLS ROPECHK OR SHOWSUM OPTION
R0823   SKEEP7 CONTROLS WHEN ROUNTINE IS IN COMMON FIXED OR FIXED FIXED BANKS

 0824   REF   3 LAST 422     37,3335  0 4632 1  STSHOSUM IC     GRABDSP
 0825   REF   3 LAST 422     37,3336  0 4637 1            IC     PREGBSY
 0826                        37,3337  0 3342 1            IC     +3
 0827   REF   2 LAST1085     37,3340  3 7770 0  ROPECHK   CA     S-ZERO
 0828   REF  14 LAST1090     37,3341  55'376 0            IS     SKEEP6       ROPECHK OPTION
 0829   REF   9 LAST1093     37,3342  3 7767 0            CA     S+ZERO
 0830   REF  14 LAST1093     37,3343  55'374 1            IS     SKEEP4       BANK NUMBER
 0831   REF  17 LAST1094     37,3344  3 7763 1            CA     S+1
 0832   REF  23 LAST1093     37,3345  55'377 1  COMMFX    IS     SKEEP7
 0833   REF  10 LAST1094     37,3346  3 7767 0            CA     S+ZERO
 0834   REF  32 LAST1088     37,3347  55'371 1            IS     SKEEP1
 0835   REF  15 LAST1093     37,3350  55'373 0            IS     SKEEP3
 0836   REF  18 LAST1094     37,3351  3 7763 1            CA     S+1
 0837   REF  13 LAST1093     37,3352  55'375 0            IS     SKEEP5       COUNTS DOWN 2 TC SELF WORDS
 0838   REF  15 LAST1094     37,3353  3 1374 0  COMADRS   CA     SKEEP4
 0839   REF 240 LAST1092     37,3354  54 001 1            IS     L            TO SET SUPER BANK
 0840   REF   4 LAST 260     37,3355  7 4560 1            MASK   H15
 0841   REF  16 LAST1094     37,3356  6 1373 1            AD     SKEEP3
 0842   REF   1              37,3357  0 5245 1            IC     SUPDACAL     SUPER DATA CALL
 0843   REF   1              37,3360  0 3403 0            TC     ADSUM
 0844   REF   1              37,3361  6 7751 0            AD     SBIT11       02000
 0845   REF   1              37,3362  0 3414 0            TC     ADRSCHK
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0846   REF 429 LAST1093    37,3363  4 0000 0  FXFX     CS      A
0847   REF  24 LAST1094    37,3364  55'377 1           TS      SKEEP7
0848                       37,3365  0 0006 1           EXTEND
0849                       37,3366  1 3371 0           BZF     +3
0850   REF   1             37,3367  3 7750 1           CA      SBIT12      04000, STARTING ADDRESS OF BANK 02
0851                       37,3370  0 3372 1           TC      +2
0852   REF   1             37,3371  3 5634 0           CA      SBNK03      06000, STARTING ADDRESS OF BANK 03
0853   REF  17 LAST1094    37,3372  55'373 0           TS      SKEEP3
0854   REF  11 LAST1094    37,3373  3 7767 0           CA      S+ZERO
0855   REF  33 LAST1094    37,3374  55'371 1           TS      SKEEP1
0856   REF  19 LAST1094    37,3375  3 7763 1           CA      S+1
0857   REF  14 LAST1094    37,3376  55'375 0           TS      SKEEP5      COUNTS DOWN 2 TC SELF WORDS
0859   REF  18 LAST1095    37,3377  51'373 1  FXADRS   INDEX   SKEEP3
0860                       37,3400  3 0000 1           CA      0000
0861   REF   2 LAST1094    37,3401  0 3403 0           TC      ADSUM
0862   REF   2 LAST1094    37,3402  0 3414 0           TC      ADRSCHK

0863   REF  14 LAST1093    37,3403  55'372 1  ADSUM    TS      SKEEP2
0864   REF  34 LAST1095    37,3404  6 1371 0           AD      SKEEP1
0865   REF  35 LAST1095    37,3405  55'371 1           TS      SKEEP1
0866   REF  12 LAST1095    37,3406  3 7767 0           CAF     S+ZERO
0867   REF  36 LAST1095    37,3407  6 1371 0           AD      SKEEP1
0868   REF  37 LAST1095    37,3410  55'371 1           TS      SKEEP1
0869   REF  15 LAST1095    37,3411  4 1372 1           CS      SKEEP2
0870   REF  19 LAST1095    37,3412  6 1373 1           AD      SKEEP3
0871   REF 364 LAST1091    37,3413  0 0002 0           TC      Q

08711  REF 430 LAST1095    37,3414  22 000 1  ADRSCHK  LXCH    A
08712  REF  15 LAST1095    37,3415  11'375 0           CCS     SKEEP5      IS CHECKSUM FINISHED
08713                       37,3416  0 3421 0           TC      +3          NO
08714                       37,3417  0 3421 0           TC      +2          NO
08715  REF   1             37,3420  0 3510 0           TC      SOPTION     GO TO ROPECHK SHOWSUM OPTION
0872   REF 241 LAST1094    37,3421  10 001 1           CCS     L           -0 MEANS A TC SELF WORD.
0873   REF   1             37,3422  0 3431 1           TC      CONTINU
0874   REF   2 LAST1095    37,3423  0 3431 1           TC      CONTINU
0875   REF   3 LAST1095    37,3424  0 3431 1           TC      CONTINU
0876   REF  16 LAST1095    37,3425  11'375 0           CCS     SKEEP5
0877   REF   4 LAST1095    37,3426  0 3432 1           TC      CONTINU +1
0878   REF   6 LAST1091    37,3427  3 7771 1           CA      S-1
0879   REF   5 LAST1095    37,3430  0 3432 1           TC      CONTINU +1  AD IN THE BUGGER WORD
0881   REF  20 LAST1095    37,3431  3 7763 1  CONTINU  CA      S+1         MAKE SURE TWO CONSECUTIVE TC SELF WORDS
0882   REF  17 LAST1095    37,3432  55'375 0           TS      SKEEP5
0883   REF  15 LAST1094    37,3433  11'376 0           CCS     SKEEP6      +1 IN SKEEP6, SHOWSUM VIA EXECUTIVE
0884   REF  25 LAST1060    37,3434  10 067 1           CCS     NEWJOB
0885   REF  10 LAST1049    37,3435  0 5532 0           TC      CHANG1
0886                       37,3436  0 3440 1           TC      +2
0887   REF   6 LAST1093    37,3437  0 5605 1           TC      CHECKNJ     -0 IN SKEEP6 FOR ROPECHK

0888   REF  20 LAST1095    37,3440  25'373 1  ADRS+1   INCR    SKEEP3
0889   REF  25 LAST1095    37,3441  11'377 1           CCS     SKEEP7
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0890   REF   1              37,3442  0 3353 1          IC     COMADRS
0891   REF   2 LAST1096     37,3443  0 3353 1          IC     COMADRS
0892   REF   1              37,3444  0 3377 1          IC     FXADRS
0893   REF   2 LAST1096     37,3445  0 3377 1          IC     FXADRS

0894   REF  16 LAST1094     37,3446  4 1374 1 NXTBNK   CS     SKEEP4
0895   REF   1              37,3447  6 3530 1          AD     LSTBNKCH       LAST BANK TO BE CHECKED
0896                        37,3450  0 0006 1          EXTEND
0897   REF   1              37,3451  1 3503 0          BZF    ENDSUMS        END OF SUMMING OF BANKS.
0898   REF  17 LAST1096     37,3452  3 1374 0          CA     SKEEP4
0899   REF   2 LAST1094     37,3453  6 7751 0          AD     SBIT11
0900   REF  18 LAST1096     37,3454 55'374 1          IS     SKEEP4         37 TO 40 INCRMTS SKEEP4 BY END RND CARRY
0901   REF   1              37,3455  0 3461 1          IC     CHKSUPR
0902   REF   2 LAST1081     37,3456  3 7745 0 17TO20   CA     SBIT15
0903   REF  19 LAST1096     37,3457 27'374 1          ADS    SKEEP4         SET FOR BANK 20
0904   REF   1              37,3460  0 3475 1          IC     GONXTBNK
0905   REF   5 LAST1094     37,3461  7 4560 1 CHKSUPR  MASK   HI5
0906                        37,3462  0 0006 1          EXTEND
0907   REF   1              37,3463  1 3473 0          BZF    NXTSUPR        INCKEMENT SUPER BANK
0908   REF   5 LAST1089     37,3464  6 2010 1 27TO30   AD     S13BITS
0909                        37,3465  0 0006 1          EXTEND
0910                        37,3466  1 3470 0          BZF    +2             BANK SET FOR 30
0911   REF   2 LAST1096     37,3467  0 3475 1          IC     GONXTBNK
0912   REF   1              37,3470  3 2006 0          CA     SIXTY          FIRST SUPER BANK
0913   REF  20 LAST1096     37,3471 27'374 1          ADS    SKEEP4
0914   REF   3 LAST1096     37,3472  0 3475 1          IC     GONXTBNK
0915   REF   1              37,3473  6 2007 1 NXTSUPR  AD     SUPKCON        SET BNK 30 + INCR SUPR BNK AND CANCEL
0916   REF  21 LAST1096     37,3474 27'374 1          ADS    SKEEP4         ERC BIT OF THE 37 TO 40 ADVANCE.
0917   REF  26 LAST1095     37,3475 11'377 1 GONXTBNK CCS    SKEEP7
0918   REF   1              37,3476  0 3345 0          IC     COMMFX
0919   REF  21 LAST1095     37,3477  3 7763 1          CA     S+1
0920   REF   1              37,3500  0 3363 1          IC     FXFX
0921   REF   1              37,3501  3 7755 1          CA     SBIT7          HAS TO BE LARGER THAN NO OF FXSW BANKS.
0922   REF   2 LAST1096     37,3502  0 3345 0          IC     COMMFX

0923   REF  16 LAST1095     37,3503 11'376 0 ENDSUMS  CCS    SKEEP6
0924   REF   3 LAST1094     37,3504  0 3342 1          IC     ROPECHK +2     START SHOWSUM AGAIN
0925                        37,3505  37777 1 S+MAX     OCTAL  37777          ** S+MAX AND S-MAX MUST BE TOGETHER
0926                        37,3506  40000 0 S-MAX     OCTAL  40000          FOR DOUBLE PRECISION CHECKING.
0927   REF   1              37,3507  0 3603 1          IC     RPCHKFIN       ROPECHK IS COMPLETE

0928   REF  22 LAST1096     37,3510  3 1374 0 SOPTION  CA     SKEEP4
0929   REF   6 LAST1096     37,3511  7 4560 1          MASK   HI5            = BANK BITS
0930   REF   5 LAST 275     37,3512  0 4541 0          IC     LEFT5
09305  REF 242 LAST1095     37,3513  54 001 1          IS     L              BANK NUMBER BEFORE SUPER BANK
0931   REF  23 LAST1096     37,3514  3 1374 0          CA     SKEEP4
09315  REF   2 LAST1080     37,3515  7 4564 0          MASK   S8BITS         = SUPER BANK BITS
0932                        37,3516  0 0006 1          EXTEND
09325  REF   1              37,3517  1 3525 1          BZF    SOPT           BEFORE SUPER BANK
0933   REF  53 LAST1094     37,3520  54 021 0          IS     SR             SUPER BANK NECESSARY
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L       AGC BLOCK TWO SELF-CHECK                                        USER'S OWN PAGE NO.  23          53  E3

 0934   REF 243 LAST1096     37,3521  3 0001 0            CA    L
 09345  REF  21 LAST1077     37,3522  7 7765 0            MASK  SEVEN
 0935   REF  54 LAST1096     37,3523  6 0021 1            AD    SR
 0936   REF 244 LAST1097     37,3524  54 001 1            IS    L          BANK NUMBER WITH SUPER BANK
 0937   REF  17 LAST1096     37,3525  11'376 0  SOPT      CCS   SKEEP6
 0938   REF   1              37,3526  0 3560 1            TC    SDISPLAY
 0939                        37,3527   00501 0  VNCON     DCIAL 00501      USED IN SHOWSUM. DISPLAY 3 REGISTERS.
 0940   REF  26 LAST1095           E0                     EBANK= NEWJOB
 0941                        37,3530   76060 0  LSTBNKCH  BBCON*           * CONSTANT, LAST BANK.

 0942   REF  38 LAST1095     37,3531  11'371 1  BNKCHK    CCS   SKEEP1     WHEN C(SKEEP6) = -0
 0943                        37,3532  0 3536 1            TC    +4
 0944   REF   1              37,3533   77563 1  SCADR     FCADR NOKILL     * CONSTANT, USED IN SHOWSUM ONLY
 0945                        37,3534  0 3536 1            TC    +2
 0946   REF   7 LAST1095     37,3535  3 7771 1            CA    S-1        FOR BANK 00
 0947   REF  39 LAST1097     37,3536  55'371 1            IS    SKEEP1
 0948   REF 245 LAST1097     37,3537  4 0001 1            CS    L          = - BANK NUMBER
 0949   REF  40 LAST1097     37,3540  6 1371 0            AD    SKEEP1
 0950   REF  41 LAST1094     37,3541  0 2056 0            TC    -1CHK
 0951   REF   1              37,3542  0 3446 1            TC    NXTBNK

R0952   INITIALIZE SKEEP6 TO +1 TO PERFORM SHOWSUM
R0953   START OF ROUTINE THAT DISPLAYS SUM OF EACH BANK
 0954   REF  22 LAST1096     37,3543  3 7763 1  SHOWSUM   CAF   S+1
 0955   REF  18 LAST1097     37,3544  55'376 0            IS    SKEEP6     SHOWSUM OPTION
 0956   REF  13 LAST1095     37,3545  3 7767 0            CAF   S+ZERO
 0957   REF   9 LAST1078     37,3546  55'355 1            IS    SMODE      PUT SELF-CHECK TO SLEEP
 0958   REF   1              37,3547  3 2021 0            CA    SELFADRS   INITIALIZE SELFRET TO GO TO SELFCHK.
 0959   REF   6 LAST1060     37,3550  55'354 0            IS    SELFRET
 0960                        37,3551  0 0004 0            INHINT
 0961   REF   1              37,3552  3 7751 0            CAF   PRIO2
 0962   REF  35 LAST1065     37,3553  0 5505 1            TC    NOVAC
 0963   REF   7 LAST1097           E2                     EBANK= SELFRET
 0964                        37,3554   03335 1            ECADR STSHOSUM
C0964   REF   1              37,3555   76062 1
 0965                        37,3556  0 0003 1            RELINT
 0966   REF 106 LAST 932     37,3557  0 5567 0            TC    ENDOFJOB

 0967   REF 246 LAST1097     37,3560  3 0001 0  SDISPLAY  CA    L          = BANK NUMBER
 0968   REF  16 LAST1095     37,3561  57'372 0            XCH   SKEEP2     SKEEP2 HOLDS BANK NUMBER DURING DISPLAY
 0969   REF  21 LAST1095     37,3562  55'373 0            IS    SKEEP3     SKEEP3 HOLDS BUGGER WORD DURING DISPLAY
 0970   REF   3 LAST1081     37,3563  3 2017 0  NOKILL    CAF   ADRS1      ADDRESS OF SKEEP1
 0971   REF 749 LAST1053     37,3564  54 146 0            IS    MPAC +2
 0972   REF   1              37,3565  3 3527 1            CAF   VNCON      DISPLAY 3 REGISTERS
 0973   REF   5 LAST 392     37,3566  0 4444 1            TC    NVSUB
 0974   REF   1              37,3567  0 3601 0            TC    SBUSY
 0975   REF  17 LAST 448     37,3570  0 4622 0            TC    FLASHON
 0976   REF  40 LAST 448     37,3571  0 4475 0            TC    ENDIDLE
 0977                        37,3572  0 3575 0            TC    +3         FINISHED WITH SHOWSUM
 0978   REF   2 LAST1097     37,3573  0 3446 1            TC    NXTBNK
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L AGC BLOCK TWO SELF-CHECK USER'S OWN PAGE NO. 24 53 E3

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 0979   REF   2 LAST1097     37,3574  0 3563 1            TC      NOKILL          SO CAN LOAD WITHOUT KILLING SHOWSUM
 0980   REF  15 LAST1050     37,3575  0 4724 1            TC      FREEDSP
 0981   REF   2 LAST1097     37,3576  3 2021 0            CA      SELFADRS        INITIALIZE SKEEP1 TO GO TO SELFCHK.
 0982   REF  41 LAST1097     37,3577  55'371 1            IS      SKEEP1
 0983   REF 107 LAST1097     37,3600  0 5567 0            TC      ENDOFJOB

 0984   REF   1              37,3601  3 3533 1  SBUSY     CAF     SCADR
 0985   REF   4 LAST 392     37,3602  0 4654 1            TC      NVSUBUSY

 0986   REF   5 LAST1078     37,3603  0 2115 0  RPCHKFIN  TC      SELFCHK         START SELF-CHECK AGAIN.

 0987   REF 431 LAST1095     37,3604  4 0000 0  SBNKOPTN  CS      A               GO TO BACKUP IDLE LOOP IF C(SMODE) IS
 0988   REF 110 LAST1073     37,3605  6 7762 0            AD      TWO             GREATER THAN OCTAL 11
 0989                        37,3606  0 0006 1            EXTEND
 0990   REF   1              37,3607  6 3613 0            BZMF    TOSMODE -2
 0991   REF  14 LAST1097     37,3610  3 7767 0            CA      S+ZERO          ZERO SMODE FOR OPTIONS ABOVE 8.
 0992   REF  10 LAST1097     37,3611  55'355 1            IS      SMODE
 0993   REF   1              37,3612  0 3633 1  SOPTON11  TC      DSKYCHK

 0994   REF  15 LAST1098     37,3613  3 7767 0            CA      S+ZERO
 0995   REF  11 LAST1098     37,3614  55'355 1            IS      SMODE
 0996   REF   6 LAST1098     37,3615  0 2115 0  TOSMODE   TC      SELFCHK

R0997   THE FOLLOWING CONSTANTS ARE USED BY DSKYCHK.
 0998                        37,3616    05265 0  DSKYCODE  OCTAL   05265           00
 0999                        37,3617    04143 0           OCTAL   04143           11
 1000                        37,3620    05471 0           OCTAL   05471           22
 1001                        37,3621    05573 0           OCTAL   05573           33
 1002                        37,3622    04757 0           OCTAL   04757           44
 1003                        37,3623    05736 0           OCTAL   05736           55
 1004                        37,3624    05634 0           OCTAL   05634           66
 1005                        37,3625    05163 0           OCTAL   05163           77
 1006                        37,3626    05675 0           OCTAL   05675           88
 1007                        37,3627    05777 0           OCTAL   05777           99
 1008                        37,3630    07265 1  +-ZERO    OCTAL   07265
 1009                        37,3631    00013 0  11DEC.    OCTAL   00013

R1010   BITS 2 AND 6 TURN ON THE COMPUTER ACTIVITY AND VERB-NOUN FLASH.
 1011                        37,3632    00042 1  S11CHAN   OCTAL   00042

 1012   REF   9 LAST 988     37,3633  3 4570 1  DSKYCHK   CAF     TEN
 1013   REF  22 LAST1097     37,3634  55'373 0            IS      SKEEP3
 1014                        37,3635  0 0004 0            INHINT
 1015   REF  23 LAST1097     37,3636  3 7763 1            CAF     S+1             SET UP TEN MS INTERRUPT
 1016   REF 129 LAST1088     37,3637  0 5663 1            TC      WAITLIST
 1017   REF  68 LAST1088                 E3               EBANK=  LST1
 1018                        37,3640    03674 1           2CADR   NXTNMBR
C1018   REF   1              37,3641    76063 0
 1019                        37,3642  0 0003 1            RELINT
 1020   REF   2 LAST1098     37,3643  0 3615 0            TC      TOSMODE         GO TO IDLE LOOP
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1021   REF  23 LAST1098     37,3644  55'373 0  SDSPTAB  IS     SKEEP3
1022                        37,3645  0 0004 0           INHINT
1023   REF  24 LAST1099     37,3646  51'373 1           NDX    SKEEP3
1024   REF   1              37,3647  4 3616 1           CS     DSKYCODE
1025   REF  46 LAST 396     37,3650  54 313 1  SBLANKS  TS     DSPTAB
1026   REF  47 LAST1099     37,3651  54 314 0           TS     DSPTAB +1
1027   REF  48 LAST1099     37,3652  54 315 1           TS     DSPTAB +2
1028   REF  49 LAST1099     37,3653  54 316 1           TS     DSPTAB +3
1029   REF  50 LAST1099     37,3654  54 317 0           TS     DSPTAB +4
1030   REF  51 LAST1099     37,3655  54 320 1           TS     DSPTAB +5
1031   REF  52 LAST1099     37,3656  54 321 0           TS     DSPTAB +6
1032   REF  53 LAST1099     37,3657  54 322 0           TS     DSPTAB +7
1033   REF  54 LAST1099     37,3660  54 323 1           TS     DSPTAB +8D
1034   REF  55 LAST1099     37,3661  54 324 0           TS     DSPTAB +9D
1035   REF  56 LAST1099     37,3662  54 325 1           TS     DSPTAB +10D
1036   REF   1              37,3663  3 3631 0           CA     11DEC.
1037   REF   8 LAST 310     37,3664  54 307 1           TS     NOUT

1038                        37,3665  0 0004 0  DSKYWAIT  INHINT
1039   REF  50 LAST1077     37,3666  3 7752 0           CAF    BIT10          5.12 SECOND WAIT
1040   REF 130 LAST1098     37,3667  0 5663 1           TC     WAITLIST
1041   REF  69 LAST1098                 E3              EBANK= LST1
1042                        37,3670   03674 1           2CADR  NXTNMBR
C1042  REF   2 LAST1098     37,3671   76063 0
1043                        37,3672  0 0003 1           RELINT
1044   REF 126 LAST1089     37,3673  0 5727 0           TC     TASKOVER

1045   REF  25 LAST1099     37,3674  11'373 0  NXTNMBR  CCS    SKEEP3
1046   REF   1              37,3675  0 3644 1           TC     SDSPTAB        9 THROUGH 0
1047   REF   1              37,3676  0 3703 0           TC     -SIGN          -ZEROS
1048   REF   1              37,3677  0 3720 1           TC     +SIGN          +ZEROS
1049   REF  17 LAST1097     37,3700  11'372 1           CCS    SKEEP2
1050   REF   1              37,3701  0 3734 1           TC     NODSPLAY       PUTS BLANKS IN DSKY DISPLAY
1051   REF   1              37,3702  0 3740 1           TC     LITESOUT       TURN OFF LIGHTS

1052   REF  24 LAST1098     37,3703  4 7763 0  -SIGN    CS     S+1
1053   REF  26 LAST1099     37,3704  55'373 0           TS     SKEEP3
1054   REF   1              37,3705  3 3632 0           CA     SIICHAN        TURN ON VERB-NOUN FLASH
1055                        37,3706  0 0006 1           EXTEND                 AND COMPUTER ACTIVITY LIGHTS.
1056   REF  21 LAST1060     37,3707  05 011 1           WOR    DSALMOUT
1057   REF   1              37,3710  4 3630 0           CS     +-ZERO
1058                        37,3711  0 0004 0           INHINT
1059   REF  57 LAST1099     37,3712  54 313 1           TS     DSPTAB
1060   REF  58 LAST1099     37,3713  54 316 1           TS     DSPTAB +3
1061   REF  59 LAST1099     37,3714  54 320 1           TS     DSPTAB +5
1062   REF  42 LAST1077     37,3715  3 6311 1           CAF    THREE
1063   REF   9 LAST1099     37,3716  54 307 1           TS     NOUT
1064   REF   1              37,3717  0 3665 1           TC     DSKYWAIT

1065   REF 304 LAST1077     37,3720  4 7767 1  +SIGN    CS     ZERO
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L AGC BLOCK TWO SELF-CHECK USER'S OWN PAGE NO. 26 S3 E3

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1066  REF  27 LAST1099   37,3721  55'373 0          IS    SKEEP3
1067  REF  25 LAST1099   37,3722  3 7763 1          CA    S+1
1068  REF  18 LAST1099   37,3723  55'372 1          IS    SKEEP2
1069                      37,3724  0 0004 0          INHINT
1070  REF   2 LAST1099   37,3725  4 3630 0          CS    +-ZERO
1071  REF  60 LAST1099   37,3726  54 314 0          IS    DSPTAB +1
1072  REF  61 LAST1100   37,3727  54 317 0          IS    DSPTAB +4
1073  REF  62 LAST1100   37,3730  54 321 0          IS    DSPTAB +6
1074  REF  43 LAST1099   37,3731  3 6311 1          CAF   THREE
1075  REF  10 LAST1099   37,3732  54 307 1          IS    NOUT
1076  REF   2 LAST1099   37,3733  0 3665 1          TC    DSKYWAIT

1077  REF  19 LAST1100   37,3734  55'372 1  NODSPLAY IS    SKEEP2          +0
1078  REF  31 LAST1077   37,3735  4 7750 0          CS    BIT12           BLANKS
1079                      37,3736  0 0004 0          INHINT
1080  REF   1            37,3737  0 3650 1          TC    SBLANKS         PUTS BLANKS IN ALL DISPLAYS

1081  REF   2 LAST1099   37,3740  4 3632 1  LITESOUT CS    S11CHAN
1082                      37,3741  0 0006 1          EXTEND
1083  REF  22 LAST1099   37,3742  03 011 1          WAND   DSALMOUT        TURN OFF COMPUTER ACTIVITY LIGHT.
1084  REF 127 LAST1099   37,3743  0 5727 0          TC     TASKOVER        END OF DSKYCHK
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END OF REVISION 0 OF PROGRAM BURN1120 BY NASA 2021106-031 LAST ASSEMBLED ON SEP 25, 1967

SYMBOL TABLE LISTING, INCLUDING PAGE NUMBER OF DEFINITION, AND NUMBER OF REFERENCES WITH FIRST AND LAST PAGE NUMBERS

SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F
002CEK	33,2606 706	1 703	128/164	21,3402 603	- - -	1JACC	E6,1613 53	6 54 612
003CEK	33,2607 706	1 704	12SEC	27,2344 682	1 680	1JACC0	E6,1614 54	6 587 625 =
004CEK	33,2610 706	1 703	12SECS13	27,3315 757	- - -	1JACCR	E6,1615 54	3 587 625 =
005CEK	33,2611 706	1 705	135ANG	23,3335 449	2 437 438	1JACCU	E6,1616 54	1 613 =
007CEK	33,2612 706	1 699	135SECS	36,2316 751	1 739	1JACCV	E6,1617 54	1 613 =
021CEK	33,2613 706	1 698	13DEC	20,2174 478	1 478	1LMP	5060 799	20 680 809
030CEK	33,2614 706	1 698	13-11,1	05,3521 312	1 311	1LMP+DT	5101 800	60 682 761
0EBANK	37,3155 1091	- - -	13,14,15	13,3001 158	1 144	1/100	31,2371 813	1 812
0.00125	20,3416 610	1 607	13,7,2	4433 170	1 170	1/12TH	32,2677 921	1 914
0.0014	20,3417 610	1 607	140SECS	27,3320 757	2 754	1/2JETSU	E6,1707 57	2 545 547 =
0.00167	16,2227 491	- - -	14C	0014 434	6 419 436 =	1/2JETSV	E6,1713 57	2 545 547 =
0.00444	20,3420 610	1 477	14-TJMIN	16,3565 515	1 501	1/2JTSP	E6,1440 50	8 506 613
0.05	20,3421 610	1 608	14-TQRMN	17,2566 530	3 530	1/2JTSQ	E6,1676 57	- - - =
0.1	20,3422 610	2 608 610	15ADRERS	01,2711 1040	71038 1042	1/2JTSR	E6,1702 57	- - - =
0.31250	16,2232 491	- - -	15BITADR	6316 960	1 966	1/2SECX	35,3350 471	1 471
0.3125	20,3423 610	1 478	15INSRT	15,3707 366	1 338	1/3DP	22,3730 909	1 903
0.35356	26,3170 616	1 613	15/16	07,3707 797	1 789	1/6	10,3332 199	1 198
0.3DE6DB	20,2173 478	- - -	160ANG	23,3337 449	1 438	1/ACCONT	20,3440 618	1 616
0.44	20,3424 610	1 607	16/25	16,3571 515	1 493	1/ACC0	E6,1717 55	8 55 624
0.62170	16,2230 491	1 489	16/25KF	20,3210 588	1 587	1/ACCR	E6,1720 55	1 620 =
0.625	20,3425 610	2 607 609	16732400	17,2563 530	- - -	1/ACCS	26,2713 612	2 490 822
0.70711	20,3426 610	2 609	170ANG	23,3342 449	1 437	1/AMIN0	E6,1721 55	6 55 621
0.88975	16,3570 515	- - -	17DEC	14,3703 409	1 387	1/AMINR	E6,1722 55	3 478 543 =
			17DECML	35,3346 471	1 467	1/AMINU	E6,1723 56	3 478 543
100CS	32,2663 920	1 918	17INSRT	17,2173 522	1 586	1/AMINV	E6,1724 56	3 478 542
100MRUPT	4275 104	1 104	17INSRTA	17,2236 523	2 523	1/DV1	E4,1430 39	2 923 =
100MSCAL	20,3207 588	- - -	17INSRTB	17,2243 523	3 522	1/DV2	E4,1432 39	2 923 924 =
100MSPTO	E6,1656 54	1 55	17INSRTC	17,2247 523	1 523	1/DV3	E4,1434 39	2 923 924 =
100ANG	23,3336 449	1 438	17INSRTD	17,2257 523	1 523	1/GYRO	12,3433 865	3 863 867
10ATI6	16,2242 491	1 491	17INSRTE	17,2215 523	1 524	1/NET+1U	E6,1706 55	1 55 =
10SECS11	36,2331 745	- - -	17INSRTF	17,2241 523	1 523	1/NET+1V	E6,1712 55	- - - =
11DAPOFF	36,2273 744	2 70 743	17TO20	37,3456 1096	- - -	1/NET+2Q	E6,1676 55	22 55 623
11DEC	14,3702 409	1 400	180ANG	23,3340 449	1 437	1/NET+2R	E6,1702 55	2 57 620 =
11DEC.	37,3631 1098	11099	180DEC	24,3641 434	- - -	1/NET+2U	E6,1707 55	1 57 =
11DSPIN	04,3301 281	5 244 285	180MS	16,2236 491	1 490	1/NET+2V	E6,1713 55	1 57 =
110CT16	11,3320 320	1 319	182LMP	33,3112 731	2 65 731	1/NET+4Q	E6,1677 55	3 619 624 =
110CT64	11,3315 320	1 319	18R	11,2474 213	1 213	1/NET+4R	E6,1703 55	- - - =
110CT75	11,3321 320	1 320	19DEC1ML	16,3750 518	2 517	1/NETACC	0066 57	8 57 562 =
11REDO1	36,2017 739	1 64	19DECML	35,3347 471	- - -	1/NETACS	E6,1706 55	1 562 =
11REDO2	36,2063 740	1 63	1ANG	23,3330 449	- - -	1/NET-1U	E6,1710 55	- - - =
115ECS9	33,3520 738	1 731	1.2SPOT	06,2006 63	3 66 70	1/NET-1V	E6,1714 55	- - - =
120MRUPT	12,2107 107	1 107	1.3SPOT	06,2014 63	1 70	1/NET-2Q	E6,1700 55	5 619 624 =
120MS	12,3053 131	- - -	1.5CSP16	16,3563 515	2 507 508	1/NET-2R	E6,1704 55	- - - =

KEY: SYMBOLS DEFINED BY EQUALS ARE FLAGGED =. OTHERS ARE NORMALLY DEFINED EXCEPT THOSE FLAGGED:

U UNDEFINED
N NEARLY DEFINED BY =
E FAILED LEFTOVER ERASE
J FAILED LEFTOVER WORD
M MULTIPLY DEFINED
O OVERSIZE- OR ILL-DEFINED
T WRONG MEMORY TYPE
C CONFLICT IN MEMORY
MM MULTIPLE ERRORS
X MISC. TROUBLE

SYMBOL TABLE LISTING: INCLUDING PAGE NUMBER OF DEFINITION, AND NUMBER OF REFERENCES WITH FIRST AND LAST PAGE NUMBERS

SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F
1/NET-2U	E6,1711 55 - - - =	250MS	06,3460 378	1 378		2•7SPOT	06,2041 64	- - -
1/NET-2V	E6,1715 55 - - - =	25.5SECS	36,2521 751	- - -		2•PG•FRT	30,3535 852	1 856
1/NET-4Q	E6,1701 55 3 619 623 =	25/32	16,3576 515	2 498 509		2-U.RATE	17,3243 541	1 525
1/NET-4R	E6,1705 55 - - - =	25/32.QR	17,2557 530	1 526		2-V.RATE	17,3344 542	1 524
1/NJETAC	0066 57 5 526 547 =	25/32KF	20,3244 589	1 589		2J3RE/J2	07,3723 797	2 789 790
1/NJTSQ	E6,1644 54 3 54	25/32QR	17,3510 546	1 551		2JETS+Q	17,3426 544	2 524 543
1/NJTSR	E6,1645 54 - - - =	25SEC	27,3521 763	1 762		2JETS+R	17,3412 543	2 525 543
1/NJTSU	E6,1646 54 - - - =	270DEG	15,3070 351	- - -		2JETS+U	17,3365 543	- - -
1/NJTSV	E6,1647 54 - - - =	270SECS	07,2217 767	1 769		2JETS+V	17,3303 541	1 541
1/PIPA1	12,3231 861 1 861	27TO30	37,3464 1096	- - -		2JETS-Q	17,3265 541	2 525 541
1/PIPA	12,3222 861 2 454 821	28SECS	07,2215 767	1 772		2JETS-R	17,3227 540	2 525 540
1/PIPADT	0765 24 8 24 868	2+U.RATE	17,3373 543	1 524		2JETS-U	17,3245 541	1 541
1/PIPAGT	35,3345 471 1 471	2+V.RATE	17,3301 541	1 525		2JETS-V	17,3346 542	1 542
1SEC11	36,2465 749 3 739 749	2BLANK	04,2557 249	5 243 283		2JETSM+U	17,3372 543	2 543
1SEC13	27,3313 757 - - -	2DPS2/3	22,3734 909	1 885 =		2JETSM+V	17,3300 541	1 542
1SEC	31,2054 802 1 801	2EBANK	37,3171 1092	11093		2JETSM-U	17,3242 541	1 541
1SEC+1	5205 807 2 212 472	2ENTRY	14,3377 403	1 404		2JETSM-V	17,3343 542	1 542
1SECRUPT	16,3636 516 1 515	2.11SPOT	06,2044 64 - - -			2K	7751 997	3 9571056 =
1SECIM	30,2545 833 1 833	2.13SPOT	06,2047 64 - - -			2K+3	4656 307	1 307
1SECX	24,3714 435 1 411	2.15SPOT	06,2052 64 - - -			2LMP	5052 799	6 680 761
1SECXT	E5,1744 46 3 411 471 =	2.17SPOT	06,2055 64 - - -			2LMP+DT	5073 800	37 687 761
1STENGOF	20,2315 481 1 90	2.21SPOT	06,2060 64 - - -			2MIN	06,3246 373	1 373
1ST02S	15,3522 361 2 392 407	2.23SPOT	06,2063 64 - - -			2MUERTH9	33,3513 738	1 737
1TO2SUB	15,3552 361 6 361	2.25SPOT	06,2066 64 - - -			2PHSCHNG	4141 81	48 675 892
1,9-OUT	17,2602 531 - - -	2.27SPOT	06,2071 64 - - -			2RNDEND	04,3112 274	- - -
		2.2SPOT	06,2017 63 1 70			2ROUND	04,3102 273	4 271 273
200DEC	30,2235 822 2 817 819	2.31SPOT	06,2074 64 - - -			2/3	07,3733 797	1 789 =
206BEGIN	35,3560 869 - - -	2.33SPOT	06,2077 64 - - -			2/3DP	22,3734 909	1 909
20BIAS	04,2657 263 2 262	2.35SPOT	06,2102 65 - - -			2/4JET+Q	17,3416 543	1 542
20INSRT	20,2203 479 1 586	2.37SPOT	06,2105 65 - - -			2/4JET+R	17,3375 543	1 543
20INSRTA	20,3057 586 1 479	2.3SPOT	06,2033 64 1 70			2/4JET-Q	17,3255 541	- - -
20INSRTB	20,3064 586 1 481	2.41SPOT	06,2110 65 - - -			2/4JET-R	17,3212 540	- - -
20INSRTC	20,3076 586 1 586	2.43SPOT	06,2113 65 - - -			2/PI	30,2677 838	1 840
20MRUPT	12,2151 108 1 107	2.45SPOT	06,2116 65 - - -			2SEC	25,3004 719	- - -
20PCTHR	36,2523 751 1 745	2.47SPOT	06,2121 65 - - -			2SECS11	36,2561 752	- - -
210CT64	26,2153 323 1 322	2.4SPOT	06,2025 63 - - -			2SECS13	27,3314 757	- - -
210CT75	26,2362 326 2 321 322	2.51SPOT	06,2124 65 - - -			2SECS	07,2221 768	1 773
21/22REG	0105 19 2 240 245 =	2.53SPOT	06,2127 65 - - -			2SECSDAP	20,3432 610	- - -
21XCTALM	26,2513 327 1 321	2.55SPOT	06,2132 65 - - -			2SEC(16)	32,2673 921	1 917
225ANG	23,3341 449 1 437	2.57SPOT	06,2135 65 - - -			2SEC(17)	30,3176 843	1 843
228LMP	33,3450 737 2 65 732	2.5SPOT	06,2036 64 - - -			2SEC(18)	32,2671 921	1 913
22.5SECS	36,2520 751 1 740	2.61SPOT	06,2140 65 - - -			2SEC(9)	30,3377 847	3 844 924
22SECS11	36,2522 751 - - -	2.63SPOT	06,2143 65 - - -			2V1ST02S	15,3543 361	2 358

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SYMBOL TABLE LISTING, INCLUDING PAGE NUMBER OF DEFINITION, AND NUMBER OF REFERENCES WITH FIRST AND LAST PAGE NUMBERS

SYMBOL H	DEFINITION	REFERENCES	F	SYMBOL H	DEFINITION	REFERENCES	F	SYMBOL H	DEFINITION	REFERENCES	F
2,10-OUT	17,2577	531 - - -		40SEC	25,3005	719 1 713		5.3SPOT	06,2264	68 1 70	
30BUF0	E4,1650	44 2 379	=	45ANG	23,3332	449 2 437 438		5.4SPOT	06,2250	68 - - -	
30BUF1	E4,1644	44 2 379	=	45DEG	24,3662	434 2 417		5.5DEGS	4374	169 1 169	
30MRUPT	12,2150	108 1 106		46BITS	23,3346	449 2 438 445		5.5SPOT	06,2267	68 - - -	
30MSGMSK	11,2703	218 1 217		4ENTRY	14,3406	404 - - -		5.6SET	30,2131	820 1 819	
30RDMSK	12,3025	131 1 112		4.11SPOT	06,2226	67 - - -		5.6SPOT	06,2256	68 - - -	
30SEC	14,3710	409 1 382		4.13SPOT	06,2231	67 - - -		5.7SPOT	06,2272	68 - - -	
30SECS13	27,3316	757 1 754		4.15SPOT	06,2234	67 - - -		5M15S	33,3501	738 1 729	
30SECS9	33,3517	738 2 732 733		4.17SPOT	06,2237	67 - - -		5/128	07,3721	797 1 789	
30SECS	07,2223	768 1 773		4.2SPOT	06,2006	67 1 70	=	5/8+1	5503	1048 11047	
33.75ANG	23,3331	449 - - -		4.3SPOT	06,2215	67 1 70		5SECS9	33,3515	738 1 736	
33PASTE	11,2511	214 2 214		4.5SPOT	06,2220	67 - - -		5,6,7,8	16,3202	507 1 506	
33RDMSK	5642	131 2 118	=	4.7SPOT	06,2223	67 - - -		600MS	13,3004	158 1 144	
342SECS	27,3321	757 1 756		4JETS+Q	17,3424	543 2 524 544		60DEC	14,3704	409 1 402	
340CT	31,2373	813 1 805		4JETS+R	17,3410	543 2 525 543		60SEC	14,3711	409 1 381	
37511ALM	14,3140	399 1 399		4JETS-Q	17,3263	541 2 525 541		610CT	27,2444	684 1 680	
38.7AT16	16,3556	515 1 507		4JETS-R	17,3225	540 2 525 540		63DEC	14,3705	409 2 400 401	
38.7MAT4	17,3503	545 1 548		4JETTORK	E6,1455	50 1 489		630CT	27,2445	684 1 680	
3990DEC	24,3642	434 1 413		4JTORK	26,3166	616 1 613		63/64+1	5504	1048 11047	
3ENTRY	14,3404	404 2 404		4SECS	4321	137 3 116 145		64UPDAT	11,3266	319 1 200	
3.11SPOT	06,2157	66 - - -		4SECSD9	33,3475	738 1 735		656SEC	27,2545	710 2 710	
3.13SPOT	06,2162	66 - - -		50MS/625	16,3071	505 1 504		65UPDAT	11,3242	319 1 200	
3.15SPOT	06,2165	66 - - -		50SECS9	33,3516	738 1 732		66SECSD9	33,3477	738 1 731	
3.17SPOT	06,2170	66 - - -		5B10	01,2760	1042 - - -		66UPDAT	11,3246	319 1 200	
3.21SPOT	06,2173	66 - - -		5BLANK1	04,2535	248 - - -		67UPDAT	11,3254	319 2 200 319	
3.23SPOT	06,2176	66 - - -		5BLANK	04,2514	248 3 241 285		67DEC	14,3706	409 1 400	
3.25SPOT	06,2201	66 - - -		5DEGS	4375	169 - - -		6+11SPOT	06,2360	70 - - -	
3.27CADR	14,2476	390 1 389		5.11SPOT	06,2275	68 - - -		6.2SPOT	06,2341	69 1 70	
3.27SPOT	06,2204	66 - - -		5.13SPOT	06,2300	68 - - -		6.3SPOT	06,2347	69 1 70	
3.2SPOT	06,2006	66 1 70	=	5.15SPOT	06,2303	68 - - -		6.5SPOT	06,2352	69 - - -	
3.31SPOT	06,2207	67 - - -		5.17SPOT	06,2306	68 - - -		6.6AT16	16,2243	491 - - -	
3.33SPOT	06,2212	67 - - -		5.21SPOT	06,2311	68 - - -		6.7SPOT	06,2355	70 - - -	
3.3SPOT	06,2146	66 1 70		5.23SPOT	06,2314	69 - - -		6LOW	23,3343	449 1 446	
3.5SPOT	06,2151	66 - - -		5.25SPOT	06,2317	69 - - -		6SECS	10,3241	196 1 195	
3.7SPOT	06,2154	66 - - -		5.27SPOT	06,2322	69 - - -		6SEC(18)	32,3052	924 1 924	
3/16	07,3677	797 1 796		5.2SPOT	06,2242	67 1 70		70SECS9	33,3521	738 1 730	
3/4	07,3711	797 1 789		5.31SET	30,2127	820 1 819		70UPDAT	11,3260	319 1 200	
3/8	07,3675	797 1 789	=	5.31SPOT	06,2325	69 - - -		71ANG	23,3333	449 2 437 438	
3SEC21	26,2524	328 1 324		5.33SPOT	06,2330	69 - - -		71UPDAT	11,3262	319 2 200 319	
3SEC	23,3345	449 - - -		5.35SPOT	06,2333	69 - - -		72DEC	14,3707	409 1 390	
3SECS	4322	137 1 158		5.37SPOT	06,2336	69 - - -		72UPDAT	11,3270	319 2 200 319	
3SECSM	4322	158 - - -	=								

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SYMBOL H	DEFINITION	REFERENCES F
73UPDAT	11,3252	319 1 200
74K	4277	104 1 106
74UPDAT	11,3244	319 1 200
75UPDAT	11,3301	320 2 200 320
76UPDAT	11,3274	319 4 200 319
77DECML	35,3315	470 3 452 466
7/12	07,3715	797 1 789
8192AUG	13,2617	153 1 153
82DEGS	4376	169 1 169
87LMP	33,3362	736 2 65 736
89TEST	04,2061	241 2 240
8,5	4434	170 1 170
90ANG	23,3334	449 1 437
90MRUPT	4274	104 1 104
90SECS	12,3052	131 2 115
925PCTHR	7743	751 1 745 =
9EDBATT	33,3250	734 1 65
9/16	07,3717	797 1 789
9ULLOFF	33,3242	734 1 65
9,6,4	01,2574	99 1 92
=-5DEG	35,3545	672 2 671
+0CHK	37,2047	1078 6 10831087
+1CHK	37,2055	1078 2 10811090
+1.5CSP	16,3562	515 1 510
+90MS	17,2574	531 - - -
+DECSGN	04,2172	242 1 242
+DIF	11,3071	222 3 222
+DOWN	00,2564	1015 1 1014
+FHIGH	30,3702	857 1 855
+FLOW	30,3537	852 2 853
+FODD	30,3677	857 1 853
+HICRIT	30,3704	857 3 853 854
+-ZERO	37,3630	1098 2 10991100
+LOOP	37,3062	1090 1 21090
+ON	04,2301	244 3 244 279
+/-XTRAN	20,2447	559 2 528 561
+SENSTAB	20,2646	564 1 557
+SIGN	37,3720	1099 1 1099
+T6TJMIN	17,2556	530 1 529
+TJMINT6	17,3501	545 1 549
+XJETS	16,2523	496 1 496
+XJETSON	27,2347	682 1 681
+XORULGE	17,2441	528 2 527 528
+XPOLICY	20,2454	559 - - -
+XSELECT	20,2411	557 1 555
+XSENSE	20,2417	557 1 557
+XTRANSL	20,2415	557 1 555
+X,A	17,2600	531 - - -
+X,B	17,2601	531 - - -
A0FS	22,3612	907 - - -
A0XS	22,3563	906 1 905
A1FS	22,3641	907 - - -
A2CNTRAL	0072	52 5 597 =
A2FS	22,3650	908 - - -
A3FS	22,3677	908 - - -
A	0000	12 431 711098 =
A+B	E6,1506	51 3 540 542
A+B/A-B	17,3174	540 - - -
ABCLOAD	05,2535	266 1 252
ABDELV	E5,1534	48 11 88 825 =
ABDVCONV	E7,1623	48 2 844 923
ABLOAD	05,2572	266 1 252
ABLOCK	33,2616	707 1 701
ABMON	36,2362	747 3 66 747
ABORT2	6003	315 1 313
ABORT3/4	27,2424	683 - - -
ABORT	6000	315 10 1571069
ABORTADR	16,2752	502 1 502
ABORTJET	20,2374	556 2 502 561
ABORTNDX	E3,1742	33 3 683 684 =
ABORTPRR	33,2023	697 1 697
ABRT23GO	04,2053	241 1 240
ABRT24GO	04,2056	241 1 240
ABS	00,3206	1026 4 9011026
ABSMIN	36,2750	930 3 930 932
ABSOLMIN	36,3665	945 1 930
ABTSTG1	25,2446	694 1 694
ABTSTGDM	25,2436	694 3 689 694
ABVAL	00,3161	1026 - - -
ABVALABS	00,3156	1026 1 964
ABVLAOSQ	0152	57 2 621 625 =
ABVLAOSR	0153	58 1 625 =
ACC4OR2X	7760	474 1 559 =
ACCDOTLG	21,3027	595 - - -
ACCDOTQ	E6,1532	52 9 52 615
ACCDOTR	E6,1534	52 2 614 =
ACCDOTSM	21,3034	596 1 595
ACCEPTUP	13,3562	229 1 229
ACCEPTWD	05,2024	250 1 250
ACCFIFTY	20,3744	625 4 478 626
ACCLIMIT	16,2254	491 1 489
ACCLJOB	30,3540	852 2 67 851
ACCOMP2	07,3132	785 3 785 788
ACCOMP	07,3123	785 - - -
ACCUROT	15,2610	345 - - -
ACCWD	E5,1646	46 3 46 456 =
ACENTRAL	0064	52 6 596 597 =
ACONST	21,3570	631 2 629 630
ACONSTP	16,3073	505 1 504
ACOS3	00,3633	1035 1 11036
ACOS=0	00,3620	1034 3 10341036
ACOSABRT	00,3704	1036 - - -
ACOSOVF	00,3702	1036 1 11034
ACOSSHR	00,3675	1036 1 11034
ACOSST2	00,3623	1034 1 21034
ACOSST	00,3606	1034 1 11034
ACOSZERO	00,3706	1036 1 11034
ACS	E4,1540	37 5 37 899 =
ADDELAY	16,2653	501 1 501
ADDINDRF	35,2610	460 1 460
ADDLT5ID	16,2524	496 1 516
ADDRCHK	37,2722	1088 - - -
ADDRESS	6147	955 - - -
ADDRWD	0106	19 77 9551026
ADDT6JTS	E6,1473	51 7 488 530
ADDTIME	11,3223	226 1 226
ADDTLT6	E6,1474	51 9 488 530
ADDTOFV	07,3434	790 2 788
AVELLINS	E4,1602	37 2 898 899 =
AVIAX	E3,1447	30 2 296 862
AVIAY	E3,1450	30 1 862
AVIAZ	E3,1451	30 1 862
AVLINS	E4,1574	37 5 898 899 =
AVRGOGTS	17,2142	521 1 521

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SYMBOL H	DEFINITION		REFERENCES F		SYMBOL H	DEFINITION		REFERENCES F		SYMBOL H	DEFINITION		REFERENCES F	
ADROFSER	36,2543	751	3 741 747		ALFLT	35,2122	454	1 453		ALWAYSG	35,2532	459	2 455 459	
ADRPCHN2	4173	82	1 82		ALGORTHM	21,3101	597	1 596		ALXIS	E5,1600	46	6 452 470	=
ADRS1	37,2017	1077	310811097		ALILP	35,2255	455	1 456		ALXXXZ	35,3316	470	1 452	
ADRS+1	37,3440	1095	- - -		ALINTIME	11,2302	209	1 200		AM	E3,1642	32	4 647 666	
ADRSCHK	37,3414	1095	210941095		ALK	E5,1602	46	7 455 461	=	AMEMORY	E4,1400	34	127 34 766	
ADS	22,3563	905	4 884 898	=	ALKCG2	35,2173	454	1 454		ANGLREAD	10,2713	189	- - -	
ADSRAX	E3,1452	31	2 296 862		ALKCG	35,2170	454	- - -		ANGLTIME	34,3474	667	1 666	
ADSRAY	E3,1453	31	1 862		ALKLP	35,2264	456	1 456		ANGX	E5,1634	46	4 457 461	=
ADSRAZ	E3,1454	31	1 862		ALL+XJTS	17,2576	531	- - -		ANGY	E5,1632	46	3 459 461	=
ADSUM	37,3403	1095	210941095		ALLCOAST	20,2127	477	3 481 515		ANGZ	E5,1626	46	3 459 461	=
ADTTFNU	22,2216	880	5 876 877		ALLDC/OC	05,2676	268	2 266		ANNNNNN	35,2770	465	2 452 460	
ADUM	0040	37	3 897 903	=	ALLDONE	12,2273	111	2 110		ANYTRANS	0071	57	5 528 559	=
ADVAN	5613	1060	- - -		ALLOOP1	35,2071	453	1 68		AOFC	26,2516	327	1 321	
AFC	E4,1554	37	2 37 886	=	ALLOOP3	35,2065	453	- - -		AORBSYST	7757	474	2 501	=
AFCCALC	22,2570	886	2 893 899		ALLOOP	35,2062	453	1 464		AOSCOUNT	E6,1732	56	7 477 588	
AFCS	E4,1546	37	8 37 899	=	ALLREAD	10,2640	187	1 188		AOSNEXT	16,3741	517	1 517	
AFLITE	22,3554	905	1 895		ALLRJETS	20,2567	562	1 561		AOSQ	E6,1660	55	20 55 625	
AFTRESET	12,3172	570	- - -		ALMCADR	1363	30	8 2951078	=	AOSQTERM	E6,1664	55	9 55 609	
AFTRIM	22,3560	905	1 895		ALMOST1	32,3126	925	1 925		AOSR	E6,1661	55	8 539 625	=
AFTRUTAD	17,3733	551	1 551		ALM/END	11,2066	201	7 200 211		AOSRTERM	E6,1665	55	3 516 609	=
AFTTCO	32,2472	918	1 918		ALOAD	05,2620	267	1 252		AOSTASK	20,3245	607	1 518	
AFULLG	22,3550	905	1 894		ALPHAM	E4,1554	34	11 777 790	=	AOSU	E6,1662	55	1 609	=
AGSMON	30,2251	822	- - -	=	ALPHAQ	E6,1417	49	7 488 634	=	AOSV	E6,1663	55	1 609	=
AHEAD5	6502	967	1 967		ALPHAR	E6,1421	49	4 337 592	=	AOTANGCK	14,3605	407	1 210	
AIMED	32,2645	920	1 920		ALPHAV	E4,1452	34	19 784 796	=	AOTAZ	E3,1467	31	8 61 166	
AIMER	32,2571	919	1 918		ALSK	35,3324	470	1 456		AOTCADR	0370	23	1 23	=
AIMING	32,2635	920	1 920		ALT	0351	23	8 109 440		AOTEL	E3,1472	31	1 161	
AINGYRO	35,3317	470	1 462		ALTA	27,2710	724	1 724		AOTMARK	13,3005	159	2 383	
AINLA	E5,1570	45	37 46	=	ALTASK	14,3527	405	2 406		AOTNB	15,3114	352	2 383 384	
A-B	E6,1707	51	3 540 542		ALTB	27,2734	725	1 725		AOTNBIMU	14,2000	380	2 210 399	
A-B/ONLY	17,3176	540	1 542		ALTCALC	34,2226	648	1 648		AOTSM	15,3241	355	- - -	
AKLOOP	35,3521	671	1 671		ALTE	34,3134	662	1 662		AOTSTALL	13,2747	157	1 157	
AKOK	35,3540	671	1 671		ALTIM	E5,1664	46	3 453	=	APSENGON	20,2175	479	4 692 756	
ALARM2	4760	314	2 3131078		ALTIMS	E5,1665	46	2 453 454	=	APSGOING	7754	474	3 477 620	=
ALARM	4755	314	45 94 922		ALTM	0060	13	2 109 405	=	APSVEX	30,3405	847	1 845	
ALARMRET	32,2353	916	1 922		ALTMET	14,3547	406	3 403 406		ARATE	34,3464	667	3 666 667	
ALARMS	24,2444	417	5 415 422		ALTOUT	12,2152	109	- - -		ARCCOS	00,3573	1034	1 964	
ALBITS	14,3667	409	1 405		ALTRATE	0353	23	7 109 440		ARCSIN	00,3571	1034	1 964	
ALCGKK	35,2165	454	- - -		ALTRMET	14,3574	406	2 403		ARCSINH	36,3266	937	- - -	
ALDK	E5,1666	46	3 454 456	=	ALTROUT	12,2217	110	- - -		ARCTRIG	15,2476	342	8 340 407	
ALFDK	35,3057	467	1 454		ALTSAVE	0363	23	12 109 222		AREARATE	E5,1553	42	3 846	=
ALFLT1	35,2126	454	1 69		ALT,R,VN	11,3100	222	1 221		ARG90	5411	1046	11046	
ALFLT2	35,2204	455	1 454		ALWAYS	14,3514	405	1 405		ARG+	7335	986	1 986	

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SYMBOL H	DEFINITION	REFERENCES F
ARGHI	00,3400 1030	21031
ARGLO	00,3451 1031	11031
ARGZERO2	7352 986	1 986
ARGZERO	7355 986	1 986
ARITH	24,2737 421	3 421
ARMDSPUN	5010 315	2 315
ARTHINSF	04,3011 272	1 271
ARTOA	12,2302 111	1 109
ARTOUTSF	04,2660 263	1 262
ARUPT	0010 12	11 601072 =
ASCALARM	32,3001 922	1 916
ASCENT	32,2125 913	5 701 924
ASCJOB	20,3531 621	1 620
ASCPATCH	32,3054 924	1 916
ASCRATEC	20,2313 481	1 479
ASCRET	E4,1450 38	5 700 920 =
ASCTERM	32,2660 920	1 922
ASCURGLM	20,2311 481	1 479
ASFTEST	21,3050 596	1 596
ASINEX	00,3670 1035	11034
ASPRT	E4,1532 37	6 37 899 =
ASTBFM1	26,2523 328	3 321 322
ASWTVLON	36,2614 753	1 753
AT	E4,1422 38	6 701 924 =
ATMAG4	33,2657 707	1 705
ATMAG	32,3005 923	2 707 758
ATMAGAD	27,3330 758	1 756
ATMEAS	E4,1430 38	5 39 911 =
ATTCADR	0372 23	1 98 =
ATTCK2	11,2612 216	3 216 439
ATTSTALL	13,2743 157	6 704 765
ATTSTEER	17,2620 533	1 521 =
AUG2	13,2632 153	1 153
AUG3	13,2610 153	1 153
AUKLOKON	11,2760 220	2 207 399
AUTORHLD	7746 474	2 475 476 =
AVEG11AD	36,2330 751	1 741
AVEG13AD	27,3323 757	1 755
AVEGADDR	30,2315 824	2 823 824
AVEGADRS	27,2342 682	2 675 683
AVEGKILL	07,2072 102	2 103 524
AVEGON	07,2372 772	1 772
AVEGOUT	30,2116 820	1 819
AVEMIDAD	30,2410 826	1 826
AVERAGEG	30,2251 823	8 682 824
AVETOMID	07,2116 766	1 826
AVGENADR	33,2646 707	2 702 733
AVGEND	30,2366 826	1 820
AVGEXIT	1072 26	32 65 922
AVGOUTF	1074 26	1 26
AVGXTEMP	E4,1405 36	4 36 888 =
AVMIDRIN	E4,1630 40	6 766 826
AVOUTADR	30,2124 820	1 820
AVRAGEG7	25,3015 719	1 714
AWAY	30,3505 851	1 851
AXC	01,2633 1038	1 963
AXIS	E4,1640 40	11 817 840
AXISCNTR	0061 57	7 536 538 =
AXISD	E4,1632 40	7 702 920
AXISFILT	30,2744 839	- - -
AXISGEN1	15,2745 348	1 348
AXISGEN2	15,2714 348	1 349
AXISGEN3	15,3017 349	1 349
AXISGEN	15,2741 348	2 384 429
AXISROT1	15,2643 345	1 345
AXISROT	15,2601 345	6 343 344
AXT	01,2626 1038	1 963
AZO	E3,1756 33	1 678
AZANG	E3,1475 31	1 300 =
AZGR	E3,1745 33	2 678
AZIMUTH	E5,1506 44	7 387 434
A(X)	07,3000 782	1 781
B12-1	4563 303	- - - =
B12T14	5655 961	1 965 =
B14-B2	10,2467 182	1 182
B3TOB4	01,3060 1045	210441045
B5TOBB	01,2747 1041	- - -
BACK1	14,3355 403	3 404 406
BACKHOME	21,3635 633	2 633
BADDES	10,2435 182	1 182
BADEND	13,2715 156	3 155 660
BADPHASE	31,2410 814	1 803
BADRAD	10,2726 189	4 189 192
BAKT04	0102 15	4 701 918 =
BANKCALL	5206 948 134	77 922
BANKJUMP	5230 948	14 771041
BANKMASK	6341 961	3 961 974
BANKRUPT	0016 12	22 1041072 =
BANKSET	0155 21	13 9511056
BASVAC	0002 167	7 161 =
BB	0006 83	5 72 82 =
BBANK	0006 12	33 601072 =
BBANKSET	20,2605 562	1 562
BBBB	14,3151 400	1 400
BBBBBBBB	27,2054 676	1 676
BBLOCK	33,2624 707	1 701
BCDU	E3,1532 32	7 645 668
BDDV	7635 994	2 962 994
BDSU	7127 979	1 962
BEGDES	10,2423 182	2 173 179
BEGIN206	35,3546 869	1 88
BEGINCDU	11,2530 215	2 200 744
BELOW1	06,2657 83	1 85
BELOW2	06,2674 84	2 84
BELOW3	06,2710 84	1 84
BELOW4	06,2713 84	2 84
BESTPOLS	20,2354 555	1 556
BETAM	E4,1556 34	2 785 787 =
BETAV	E4,1460 34	9 784 788 =
BGIM21	21,3617 632	1 632
BGIM23	16,2220 491	1 490
BGIM24	17,2614 532	2 521 533
BGIM	21,3242 599	1 599
BGIMBALS	07,2075 102	1 102
BHIZ	01,2734 1041	- - -
BIASCOM	04,2607 462	2 262 263
BIASHI	00,2542 1013	11030
BIASLO	00,2270 1006	11031
BIBIBIAS	30,2011 817	2 676 817
BIGBOX	E6,1766 56	1 604
BIGLOAD	21,3410 604	1 603
BIGNO	36,3653 945	1 938
BIN3	6311 197	2 189 =
BINCON	4570 303	3 246 997
BINROUND	04,3021 272	2 271 272
BIT10	7752 997	50 741099
BIT11	7751 997	44 1161077
BIT12	7750 997	31 811100

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SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F
BIT12-13	21,2377 581 - - -	BORTENT	4762 314	1 315	C2SQP	E3,1607 32	3 664 =
BIT13	7747 997	32 1191077	BOTHSGN	04,2265 244	1 244	C33JMP	12,3027 131	1 119
BIT13-14	5210 948	4 404 610 =	BOV(B)	01,2741 1041	1 963	C33TEST	12,2477 118	6 115 117
BIT14	7746 997	60 881077	BPL	01,2765 1042	11042	C3/2	5415 1046	11046
BIT14COM	06,2706 84	1 84	BPL/BMN	01,2756 1042	1 963	C5/2	5416 1046	11046
BIT15	7745 997	42 811077	BRANCH	7001 976	8 9861042	CADAVER	07,2077 102	1 101
BIT1	7763 997	65 1271077	BRATE	E3,1634 32	4 666 669 =	CADR1	35,3556 869	- - -
BIT2	7762 997	35 1091077	BRIGN1	0000 878	1 880 =	CADR2	35,3567 870	- - -
BIT3	7761 997	25 1631076	BRIGN2	0002 878	1 886 =	CADR3	35,3600 870	- - -
BIT4	7760 997	49 921076	BRLING	0001 878	1 883 =	CADR4	35,3605 870	- - -
BIT4H	32,3051 924	1 923	BRNCHCON	04,2556 248	1 248	CADRSTOR	0327 22	8 98 290
BIT5	7757 997	33 921076	BRTTFNU	0001 876	1 880 =	CADRTAB	06,2001 63	1 73 =
BIT6	7756 997	46 981076	BRUPT	0017 12	- - - =	CAGESUB2	12,3014 130	1 117
BIT7	7755 997	41 821076	BRXEND	0006 876	1 888 =	CAGESUB	12,3002 130	2 115 125
BIT8	7754 997	36 821077	BRXMID	0003 878	1 887 =	CAGETEST	13,2674 155	5 141 153
BIT8,9	17,2564 530	- - -	BUF2	0123 20	23 1491035	CAGETSTJ	13,2706 155	3 138 148
BIT9	7753 997	21 1151077	BUF	0120 20	144 201059	CAGETSTQ	13,2701 155	6 138 147
BIT5364	13,2776 158	3 138 140	BUF+	00,2420 1009	31009037	CALCDIR	E5,1614 45	4 418 436 =
BIT5465	12,3041 131	2 116 130	BUF-	00,2414 1009	31009037	CALCGA1	15,2713 347	1 347
BIT5466	13,2777 158	2 138	BUFNEG	00,3725 1037	11009	CALCGA	15,2655 346	2 385 425
BIT54-6	13,3000 158	1 145	BUFNORM	00,2476 1012	11012	CALCGRAV	30,3103 842	3 827 843
BIT56615	12,3050 131	1 130	BUFPOS	00,3712 1037	21009037	CALCGTA	15,2425 340	2 385 426
BIT5668	20,2606 562	1 555	BUFZERO	00,2362 1009	11037	CALCPHI	34,2736 659	1 658
BIT5768	12,3044 131	1 115	BUMP	04,3343 284	2 252 285	CALCRATE	23,3047 442	1 438
BIT58,9	16,3601 515	- - -	BURGZERO	17,3310 542	1 539	CALCRVG	30,3137 842	2 821 889
BIT59,10	06,3363 376	3 375 376	BURN	22,2043 876	1 751 =	CALCSFE	24,2713 421	- - -
BIT5E1	12,2303 111	1 109	BURNADR	36,2331 751	1 743	CALCTGO	33,3277 734	1 734
BLANKCON	04,2572 249	2 249 262	BURNDB	6107 831	1 480	CALL	6716 974	11042
BLANKRET	0104 19	- - - =	BVECTOR	E4,1466 34	- - - =	CALLCODE	5344 998	1 966
BLOAD	05,2631 267	1 252	BVSU	7103 979	1 962	CALLKALC	33,3023 730	1 63
BMAGX	0042 12	- - - =	BZE/GOTO	01,2751 1042	1 963	CALL/ITA	01,2771 1042	1 963
BMAGY	0043 12	- - - =	BZFCHK	37,2300 1082	- - -	CAM	E3,1644 32	5 32 662
BMAGZ	0044 12	- - - =	BZMFCHK	37,2166 1080	- - -	CATCHFIN	11,3146 224	1 224
BMEMORY	E5,1570 46	7 68 823 =	B(X)	07,3017 782	1 781	CBLOCK	33,2642 707	1 701
BNKCAL+2	5210 948	11061	**********			CBMCALC	34,3076 662	1 662
BNKCHK	37,3531 1097	- - -	COY	27,3070 727	1 724	CBXPNDR	27,2547 710	2 710
BNKJUP+4	5234 948	11061	C1MP	E3,1621 32	2 664 666 =	CCALL	6704 974	1 962
BNKOPTN	37,2100 1078	- - -	C1PP	E3,1617 32	4 664 666 =	CCCC	14,3164 400	1 400
BODYRATE	17,2012 519	- - -	C1/2	5414 1046	11046	CCSCHK	37,2125 1079	11079
BODYVECT	33,2640 707	5 702 912	C1Y	27,3072 727	1 724	CCSHOLE	4736 313	60 2431059
BOOP	35,2343 457	1 457	C2MP	E3,1615 32	2 664 666 =	CCSMPRET	36,2332 745	2 65 753
BOOSTADR	27,2343 682	1 681	C2PP	E3,1613 32	7 664 666 =	CDRVE	12,2056 106	2 106
BOOSTMON	30,2273 823	1 682	C2SQM	E3,1611 32	2 664 =	CDU2DOT	0063 53	8 576 579 =

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SYMBOL	H	DEFINITION		REFERENCES	F		SYMBOL	H	DEFINITION		REFERENCES	F		SYMBOL	H	DEFINITION		REFERENCES	F	
CDU3DOT		E6,1570	53	2 576 577			CHAN12		0012	59	1 141		=	CHKCOMED		35,3371	471	3 454 464		
CDU		0072	53	8 576 579	=		CHAN12D		14,3433	404	1 403			CHKCORS		13,2157	143	1 143		
CDUANG		E5,1677	45	2 442		=	CHAN13		0013	59	3 246 311		=	CHKFAIL1		4767	314	- - -		
CDUCHECK		24,2303	415	1 415			CHAN14		0014	59	1 144		=	CHKFAIL2		4773	314	1 314		
CDUDANG		E5,1574	45	- - -		=	CHAN33		0033	59	- - -		=	CHKFAILS		20,2360	556	1 556		
CDUDOT		0061	53	7 576 579		=	CHAN5D		14,3375	403	1 403			CHKGIMBL		17,2610	532	1 521		
CDUFAD		32,2124	512	1 512			CHAN6D		14,3413	404	1 403			CHKMNITR		17,2121	521	1 521		
CDUFLAG		E5,1615	45	3 418 420		=	CHAN		E5,1577	45	3 403		=	CHKRTIMR		16,2414	494	2 495		
CDUINC		15,3602	363	6 205 365			CHANDSP		05,2436	260	1 260			CHKSMART		16,2566	497	3 494		
CDUIND		E3,1460	31	12 141 144		=	CHANG1		5532	1049	10 2241095			CHKSUM14		14,3751	410	- - -		
CDUJOBAD		33,2662	708	1 705			CHANG2		5540	1049	1 954			CHKSUM15		15,3724	366	- - -		
CDULIMIT		E5,1577	45	4 442 448		=	CHANGVB		13,3403	166	1 166			CHKSUM16		16,3761	518	- - -		
CDULMIT		E7,1405	47	2 90 338			CHANJOB		01,3163	1053	3 10491060			CHKSUM17		17,3766	551	- - -		
CDULOGIC		15,3457	360	15 184 841			CHANLOAD		05,3044	270	1 270			CHKSUM21		21,3770	635	- - -		
CDUNDX		E5,1672	45	15 410 442		=	CHAR		0107	19	5 240 242		=	CHKSUPR		37,3461	1096	11096		
CDURATE		23,3024	442	3 438 442			CHARALRM		04,3313	282	13 249 241			CHKTEMX		30,2663	837	1 837		
CDUREADF		E5,1575	45	4 442 448		=	CHARIN		04,2002	240	1 228			CHKTIME		11,3140	224	1 224		
CDUREADT		E5,1576	45	3 442 448		=	CHCNTR		E4,1655	44	8 379		=	CHKUPLEX		31,2250	810	3 810 812		
CDUTEMP		1330	29	13 836 841		=	CHECKASG		35,3533	671	1 671			CHKVISFZ		16,2404	494	1 491		
CDUTIMEF		E5,1572	45	2 442		=	CHECKB		4242	85	1 82			CHKX		23,2716	439	1 439		
CDUTIMEI		E5,1570	45	2 442		=	CHECKG1		24,3000	423	1 425			CHNL12		0066	599	3 599		=
CDUTODCM		34,2445	654	3 645 646			CHECKG3		24,3043	423	2 423			CHOICE1		30,3231	845	- - -		
CDUX		0032	12	35 136 836		=	CHECKG5		24,3046	423	1 423			CHOICE2		30,3241	845	1 845		
CDUXCMD		0050	12	3 125 216		=	CHECKG		24,2776	423	3 413 435			CHRPRIO		5210	303	4 228 311		=
CDUXD		0766	24	16 24 841			CHECKLD1		14,2616	392	1 392			CKDOTIME		06,3415	377	1 377		
CDUY		0033	12	25 137 836		=	CHECKLD2		14,2620	392	1 392			CKSGNAN2		34,3353	665	1 665		
CDUYCMD		0051	12	1 125		=	CHECKLD		14,2577	392	4 391 392			CKTRMCTR		16,2417	494	2 495		
CDUYD		0767	24	8 337 671		=	CHECKM		24,3030	423	2 423			CLEAR1		04,2501	247	1 247		
CDUYFIL		E6,1553	53	4 576 591			CHECKMAX		34,2214	648	1 647			CLEAR		04,2446	247	1 240		
CDUZ		0034	12	17 120 836		=	CHECKMM		4133	77	6 321 461			CLEARASC		20,2154	478	1 478		
CDUZCMD		0052	13	1 125			CHECKNJ		5605	1060	6 10601095			CLEARCH5		21,3675	634	1 574		
CDUZD		0770	24	4 223 671		=	CHECKP		24,3015	423	2 423			CLOAD		05,2646	267	1 252		
CDUZFIL		E6,1555	53	2 580 591			CHEKAVEG		30,2072	819	- - -			CLOG2732		32,3124	925	1 925		
CDUZOTST		24,2656	420	3 419 421			CHEKBITS		16,2005	487	2 488 492			CLPASHI		04,2464	247	1 247		
CGOTO		6761	975	1 962			CHEKDRIV		21,2763	594	1 594			CLPASS		0306	22	12 98 288		
CGTH		36,3133	934	1 929			CHGPHASE		30,2230	822	1 822			CLR5		04,2504	247	1 247		
CH12BITS		14,3671	409	2 404			CHK2		23,2615	437	1 438			CLT/2		E4,1411	36	9 36 886		=
CH30DSPY		23,3133	445	2 445 447			CHK5		23,2654	438	1 439			CMEMORY		1155	28	5 28		
CH30WAKE		23,3355	449	2 447			CHK6		23,2766	440	1 440			CMPX1		E5,1601	46	2 456		=
CH5MASK		0102	15	7 88 572	=		CHK7		23,2754	440	1 440			CNGL		34,2441	653	2 661 664		
CH5TEMP		E6,1654	54	2 551 589			CHKAKS		35,3520	671	1 671			CNTRCHK		37,3302	1093	- - -		
CH6MASK		0103	15	7 88 572	=		CHKAPS		16,3716	517	1 516			CNTRCON		37,2000	1077	11093		
CHAN11D		14,3421	404	1 403			CHKCNTR		21,3736	635	1 593			CNTRLOOP		37,3303	1093	11093		

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COAROFIN	0005	15	6 380 407 =	CONC+51	37,2011	1077	11093	CIHETA	E3,1632	32	1 671
COARS1	13,2101	141	1 141	CONC+52	37,2014	1077	11094	CIR	0066	57	3 501 502 =
COARS2	13,2124	142	2 142 144	CONORBIT	27,2353	682	2 241 682	CIRABS	31,2303	811	3 811
COARS	13,2074	141	1 141	CONST	32,2553	919	1 919	CIRAD	31,2306	811	2 811
COARSERR	13,2202	143	2 143	CONT1/AC	26,3132	615	1 613	CIRADSUB	31,2314	811	1 811
COARSTOL	13,2210	143	1 143	CONTBL2	06,2527	73	2 75 76	CURT9	33,3032	730	1 730
COARZERO	23,3255	447	4 437 439	CONTCADR	26,3171	616	1 615	CURTAINS	4743	313	7 704 759
COASTINT	07,2471	774	1 772	CONTINU	37,3431	1095	51095	CURTBB	4754	313	1 313
CODE	0114	19	13 241 285 =	CONTMANU	34,3642	870	2 869	CURTJOB	27,3334	759	2 749 755
COEFFA1	20,3311	608	1 610	CONUMNOR	05,2756	269	1 269	CUTOFF1	33,3325	735	1 736
COEFFA	0062	57	5 607 610 =	CONVSW	0074	15	2 916 932 =	CUTOFF2	33,3347	735	1 735
COEFFAST	20,3261	607	1 609	COPYCYCL	30,2173	821	1 822	CUTOFF	33,3340	735	2 65 735
COF	E3,1623	32	53 645 666	CORCTIIM	11,3214	226	1 227	CVEX1	30,3407	847	1 846
COFMAXGO	34,2273	649	- - -	CORE INC	01,3265	1056	210521056	CVEX2	30,3410	847	1 846
COFSKEW	E3,1634	32	7 32 650	CORFOUND	01,3116	1052	- - -	CVEX3	30,3411	847	1 846
COGAVAIL	E3,1673	32	4 930 932	CORRECT	24,2601	419	1 421	CVEX4	30,3412	847	1 846
COGDSOVF	36,3343	938	1 936	CORSCHK2	13,2171	143	2 143	CVEX5	30,3413	847	1 846
COGDSTOR	36,3204	936	1 938	COS22.5	17,3323	542	3 539 542	CYCLSHFT	37,3311	1093	- - -
COLDFILT	21,2766	594	1 594	COS27	E7,1601	48	1 911	CYL	0022	12	23 2421094 =
COLDSK1	27,3056	727	- - -	COSCDU	E4,1646	40	4 840 841	CYLTIMES	E4,1471	43	3 372 =
COLDSOAK	27,2670	724	3 67 764	COSFN	36,3232	936	1 937	CYR	0020	12	50 731094 =
COMADRS	37,3353	1094	21096	COSINE	00,3500	1032	1 964	C(BRUPT)	37,2772	1089	11088
COMMAND	E3,1455	31	13 137 153 =	COSMG	E6,1457	50	1 136				
COMMEGS	26,2746	612	1 612	COSOBL	27,3076	727	3 725	D13TRMAD	27,3473	762	1 762
COMMFX	37,3345	1094	21096	COSTH	0020	44	10 340 407 =	D1/1024	36,3635	945	3 935 937
COMNEG	13,2211	144	1 142	COUNT	0133	20	17 241 285 =	D1/2	36,3645	945	4 740 937
COMNEXIT	20,2106	475	2 475 476	COUNTBOX	E6,1743	56	1 603	D1/32	36,3641	945	1 935
COMP12	34,2306	649	1 649	COUNTCHK	37,3057	1090	11079	D1/4	36,3643	945	3 929 936
COMP	1122	996	4 9641026	COUNTDWN	21,3703	834	1 575	D1/64	36,3637	945	2 929 940
COMPCHK	12,3477	865	1 864	COUNTFC	E4,1403	36	3 36 896 =	D21	E3,1603	32	2 661 662 =
COMPGS	35,2566	460	1 459	COUNTFCT	E4,1404	36	4 36 895 =	D2CDUYFL	E6,1563	53	9 576 858
COMPICK	05,2443	260	2 260	COUNTPL	E5,1676	45	8 413 427 =	D2CDUZFL	E6,1565	53	6 580 858
COMPMATX	34,2024	645	1 646	CPHI	E3,1631	32	7 645 726	DAD	7043	977	1 962
COMPNUMB	E4,1722	41	5 321 325	CPSI	E3,1633	32	2 646 671	DANZIG	6125	954	59 3501045
COMPOS	13,2136	142	1 142	CPT6/4	E4,1756	41	7 526 892 =	DAPBOOLS	0077	15	65 215 858 =
COMPTEST	05,2576	259	8 259 267	CRIT	30,2546	833	1 833	DAPHIGH5	26,2575	553	1 553
COMPTORK	E7,1563	48	4 336 460	CRITCON	04,2204	243	1 242	DAPHIGH7	26,2574	553	1 553
COMPIST1	05,2400	259	- - -	CRS2	E4,1524	37	6 37 883 =	DAPIDLEI	16,2042	488	1 496
COMPUT	24,3257	427	1 416	CSPAT1	20,3211	588	1 587	DAPIDLER	16,2037	488	2 99 490
COMZERO	13,2221	144	2 142 144	CSPAT1P	16,3603	515	1 493	DAPINIT	01,2601	99	- - -
CON1	4214	82	1 82	CSPERDAY	27,3112	727	1 724	DAPLOGIC	30,3713	857	1 855
CON2	06,2722	84	1 82	CSPINKF	20,3213	588	1 587	DAPLOW6	16,3600	515	- - -
CON2ADR	4225	82	1 82	CSPSW	16,3753	518	1 517	DAPLRETN	30,3632	855	2 858

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U UNDEFINED — E FAILED LEFTOVER ERASE — M MULTIPLY DEFINED — I WRONG MEMORY TYPE — MM MULTIPLE ERRORS
N NEARLY DEFINED BY = — J FAILED LEFTOVER WORD — O OVERSIZE- OR ILL-DEFINED — C CONFLICT IN MEMORY — X MISC. TROUBLE

SYMBOL TABLE LISTING, INCLUDING PAGE NUMBER OF DEFINITION, AND NUMBER OF REFERENCES WITH FIRST AND LAST PAGE NUMBERS

SYMBOL H	DEFINITION		REFERENCES	F	SYMBOL H	DEFINITION		REFERENCES	F	SYMBOL H	DEFINITION		REFERENCES	F
DAPOFF	11,2552	215	3 69 215		DEC17	24,3647	434	2 412 429		DELDOT26	26,3174	616	1 614	
DAPOFFDT	1345	29	3 70 743		DEC200	27,3600	765	1 765		DELFROLL	34,3755	672	2 672	
DAPROOT	26,2564	553	1 553		DEC45	5353	998	2 967 1040		DELINDEP	E3,1734	33	9 931 943	
DAPSQRT1	26,2547	553	1 553		DEC56	24,3661	434	2 413 416		DELLOAD	11,2202	205	1 205	
DAPSQRT2	26,2561	553	1 553		DEC585	24,3650	434	2 413 428		DELM	E5,1704	46	6 455 456	=
DAPSQRT3	26,2570	553	1 553		DEC6000	27,2525	710	1 710		DELMLP	35,2224	455	1 455	
DAPSQRT	26,2525	552	2 508 589		DECBRNCH	0271	22	16 241 270		DELQ	0062	51	- - -	=
DAPT4	12,3164	135	1 135		DECCOUNT	16,3737	517	1 517		DELR	E4,1452	34	5 300 839	=
DAPT4S	12,3161	135	3 108 135		DECDSP3	05,2522	261	2 261		DELTADOT	16,2233	491	- - -	
DAPTIME	E6,1543	53	4 575 633		DECDSP	05,2445	260	1 252		DELTAP	0062	50	3 493 494	=
DAREATMP	E5,1557	42	5 822 847	=	DECEND	04,2160	242	2 242		DELTAQ	E4,1576	35	1 301	=
DAS++	37,2372	1083	- - -		DECISION	07,2324	772	1 767		DELTAT9	33,3511	738	1 735	
DAS+INCR	37,2371	1083	- - -		DEC-399	20,3427	610	1 607		DELTAV	1224	29	7 324 774	=
DAS+-	37,2402	1083	- - -		DECON	04,2211	243	1 242		DELTIME	36,3414	940	1 931	
DASAMPL	10,3069	191	1 193		DECOUNT	0107	19	24 254 273	=	DELV	0403	26	8 454 889	=
DAS-+	37,2430	1084	- - -		DECQTIMR	16,2427	495	1 494		DELVBUF	E3,1764	33	3 33 685	
DATACALL	5241	949	1 277		DECREI	0105	19	2 269 270	=	DELVEL	E4,1460	34	3 300	=
DATADSP	24,2745	422	1 422		DECROUND	04,3172	278	1 278		DELVX	0403	23	19 26 862	
DATAFAIL	10,3146	194	1 190		DECRTIMR	16,2431	495	1 494		DELVY	0405	46	10 337 862	=
DATAGOOD	7761	474	2 488 620	=	DECTEM	0112	19	3 261	=	DELVZ	0407	46	9 337 862	=
DATALD	24,3072	425	2 413 416		DECTOBIN	04,2125	242	1 241		DELYOFF	24,3652	434	1 415	
DATAPL	E5,1626	45	24 412 428	=	DEGCOM	04,2643	263	1 262		DENOM	E6,1446	50	2 508	
DATAWAIT	4506	289	- - -		DEGCON1	04,3004	272	1 271		DEPCRIT	36,3671	945	1 931	
DATWAIT1	7015	290	1 290	=	DEGCON2	04,3006	272	1 273		DEPVAR	E3,1726	33	3 931 942	
DB	0375	23	10 475 549		DEGINSF2	04,2752	271	1 273		DERCLOOP	22,3404	901	1 901	
DBMINIMP	E6,1630	54	4 54 549		DEGINSF	04,2741	271	1 271		DERCOF+1	0143	21	- - -	=
DBMNMP	16,2235	491	- - -		DEGOUTSF	04,2573	262	2 262		DERCOF-1	0141	21	- - -	=
DBMNMPAX	E6,1632	54	4 477 507		DEG/SEC	23,3361	449	1 442		DERCOF-2	0140	21	- - -	=
DBSELECT	7755	474	2 475	=	DEGTAB	04,2653	263	2 263		DERCOF-3	0137	21	- - -	=
DBWIDE	16,3637	516	1 515		DEGTTF-1	22,3711	909	- - -		DERCOF-4	0136	21	- - -	=
DCDUY	E6,1416	47	2 833 834	=	DEL	0065	52	3 597 598	=	DERCOF-5	0135	21	- - -	=
DCDUYFIL	E6,1557	53	6 576 633		DELAREA	E5,1551	42	5 335 846	=	DERCOF-6	0134	21	- - -	=
DCDUZ	E6,1420	47	3 833 834	=	DELAY	E4,1614	43	1 377	=	DERCOF-7	0133	20	- - -	=
DCDUZFIL	E6,1561	53	4 580 592		DELAYCTR	1007	25	2 61 488		DERCOF-8	0132	20	- - -	=
DCMTOCDU	34,2711	658	3 645 726		DELAYEX	5713	1064	11064		DERCOFN	0142	21	1 902	=
DCOMP	7737	996	2 996		DELCDUX	0771	24	6 24 586		DERPTR	0131	20	3 901	=
DDDD1	14,3216	400	1 401		DELCDUY	0772	24	2 32 476	=	DERTABLL	22,3470	902	1 900	
DDDD	14,3205	400	1 402		DELCDUZ	0773	24	2 32 476	=	DES	26,3010	613	1 613	
DDV	7631	994	1 962		DELCOMP	34,2564	656	2 645 666		DESANGLE	24,3636	434	2 420	
DDVCALL	00,2754	1020	21021		DELDCDU1	0772	32	1 671	=	DESCADR	17,2615	532	1 535	
DDV/BDDV	00,2352	1009	4 890 994		DELDCDU2	0773	32	1 671	=	DESCBITS	11,2707	418	1 164	
DEC1000	27,3551	765	1 765		DELDCDU	0771	32	5 648 672	=	DESCOUNT	0427	24	3 179 182	
DEC1300	27,3606	765	1 765		DELDEP	E3,1732	33	3 931 943		DESLOOP	10,2430	182	1 182	

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SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F
DESLOTSX	E3,1475 31	1 300 =	DLCDUIDX	E6,1651 54	- - -	DODLOAD*	6210 957	2 966 969
DESLOTSY	E3,1475 31	1 300 =	DLOAD	6537 970	1 962	DODOWNTM	15,2001 330	2 60 61
DESRET	0426 24	7 24 220	DLOADCOD	5345 998	1 969	DOFCSTST	11,2406 211	1 200
DESRETRN	10,2346 179	4 179 357	DLOAD*	5346 998	1 957	DOFSTART	01,2042 89	4 92 95
DETCODE	0374 167	5 160 161 =	DLOOP	16,3667 516	1 517	DOIT	30,3634 855	- - -
DETVBZI	13,3121 160	5 160 161	DLOOPBGN	16,3666 516	1 516	DOMSG	11,2742 219	2 219
DF2CADR	16,2224 491	1 490	DLOOPCHK	16,3713 517	1 517	DONBRD	10,2510 184	1 183
DFICAL	27,3341 759	1 755	DLY2	5671 1063	11064	DONEADR	30,2676 837	1 836
DFITMCAL	27,2204 680	2 319 765	DMP1	7624 994	1 962	DONEDID	12,2276 111	2 109 110
DFITMCL1	27,2213 680	1 680	DMP	7155 981	10 242 896	DONESW	0075 15	6 912 932 =
DFITMCL2	27,2220 680	- - -	DMPNSUB	7375 987	4 881 901	DOOI	25,2524 713	1 713
DFORAXIS	16,3755 518	1 516	DMPNTEMP	0125 20	2 987 =	DOPIF	30,3620 855	2 854
DFRNT	04,3261 281	- - -	DMPR	7626 994	1 962	DOPROC	04,3470 491	2 290 306
DGBF	26,3167 616	2 614	DMPSUB	7161 981	20 9831035	DOQRSKIP	17,2475 529	1 529
DGBITS	10,2707 188	2 188 191	DMY13TRM	27,3473 762	1 762	DOROLL	34,3721 872	1 872
DGCHECK2	10,3064 191	2 193	DMYADRES	0007 329	- - - =	DORREPOS	10,2051 173	1 134
DGCHECK	10,3127 194	2 190 191	DMYECADR	0007 329	- - - =	DORROUT	10,2631 186	1 186
DGTS	21,2544 585	1 581	DNCDUCNT	E7,1403 47	4 338 366	DORSAMP2	10,3305 198	- - -
DGTSPADR	21,2403 581	1 580	DNCDUEND	15,2413 338	2 338	DORSAMP	10,3301 198	4 198 214
DIDFLG	0350 23	6 97 440	DNCDUN	E7,1404 47	2 90 338	DORUPDUM	20,3214 589	1 551
DIDRESET	12,2304 111	1 111	DNCDUS	15,2354 338	1 215	DOSSHFT	00,2322 1007	11007
DIFEQ0	07,3471 791	1 794	DNCDUSGO	15,2365 338	3 338 366	DOSTORE	6431 965	1 954
DIFEQ+0	07,3526 793	1 790	DNDP1-1	15,2233 334	1 330	DOT6RUPT	16,2000 484	1 484
DIFEQ+1	07,3532 793	1 790	DNDP2-1	15,2234 334	1 330	DOT	7410 988	1 962
DIFEQ+2	07,3543 793	1 790	DNLINCR	15,2235 334	1 330	DOTERM	04,3466 491	1 290
DIFEQCNT	E4,1605 35	14 770 795 =	DNLSTADR	0411 23	3 98 330	DOTIMES	E4,1606 43	3 377 378 =
DIFEQCOM	07,3635 795	2 793	DNPHASE1	15,2006 330	3 98 339	DOTINC	0126 20	7 20 989
DIFEQTAB	07,3431 790	1 790	DNQ	E7,1406 47	8 331 333	DOTIXBR	01,2706 1039	- - -
DIFFANG	E5,1531 48	- - - =	DNSNAP	15,2112 332	1 330	DOTJMIN	17,3615 549	2 549 551
DINO	14,3356 403	1 403	DNSNAP-1	15,2113 332	1 331	DOTORQUE	16,2316 493	1 493
DIRADRES	6152 955	2 969	DNSNAP-2	15,2114 332	1 331	DOTRET	0127 20	8 201028
DIRECT	0103 15	3 701 915 =	DNTM1	0034 59	1 332 =	DOTSUB	7230 983	3 989
DIRECTN	24,2570 419	3 419 421	DNTM2	0035 59	1 332 =	DOUBLK	04,2553 248	2 247 248
DISINDAT	12,2225 110	2 109 110	DNTMBUFF	E7,1407 47	12 61 744	DOV67	31,2202 809	1 325
DISINDT	11,3007 221	1 211	DNTMEXIT	15,2140 332	7 331 338	DOV70	31,2153 808	1 325
DISINDUN	11,3060 222	1 222	DNTMFAST	12,2741 128	1 131	DOV71	31,2155 808	1 325
DISINLUP	11,3040 222	2 221 222	DNTMGOTO	E7,1401 47	14 90 887	DOV72	31,2157 808	2 325 808
DISPDRIV	21,2561 590	- - -	DOALARM	07,2106 314	2 93 314	DOV73	31,2165 809	1 325
DISPLACE	05,2753 269	2 268 269	DOCHECKG	24,3737 435	2 382	DOV74	07,2003 101	1 319
DISPLACT	E6,1515 51	3 488 590	DOCURIN	36,2430 749	1 741	DOVLOAD	6532 969	1 966
DISTEM	0112 19	3 259 =	DODELAY	30,2623 836	1 837	DOVLOAD*	6535 969	1 966
D--ECHK	37,2705 1087	- - -	DODES	10,2470 183	1 182	DOW..	07,3655 796	1 794
D--SC	37,2657 1087	- - -	DODLOAD	6527 969	1 966	DOWN2LPS	E4,1723 41	5 887 =

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DP0	33,2642 912	4 701 918 =	DQUARTER	07,3701 797	2 786 =	DSPLIST	0333 22	11 98 308
DP1OUTSF	04,2665 263	1 262	DRFTSUB2	12,3420 864	1 868	DSPLOCK	0303 22	10 98 308
DP1/10	30,3170 843	1 842	DRIFT1	E5,1640 46	2 412 458 =	DSPLV	05,3252 280	- - -
DP1/12	15,3235 354	1 353	DRIFT0	E5,1636 46	2 414 457 =	DSPMM1	05,3403 290	2 77 250
DP1/2	07,3727 797	4 778 791	DRIFTSUB	12,3400 864	3 862	DSPMM	05,2001 250	2 90 311
DP1/3	07,3703 797	1 778	DRIFTT	E5,1576 46	4 411 458 =	DSPMMEND	05,3413 290	1 310
DP1/4	07,3701 797	5 777 797	DRIVELIM	E6,1747 56	1 603	DSPMMJOB	35,2011 77	1 77
DP1/8TH	30,3166 843	1 842	DRIVFACQ	E6,1750 56	2 56 603	DSPMMTEM	0130 20	2 290 =
DP2OUTSF	04,2672 264	1 262	DRIVFACR	E6,1752 56	- - - =	DSPMSK	7765 280	1 279 =
DP2/3	07,3733 797	2 793 797	DRIVRAD	24,2421 417	1 417	DSPOCTIN	04,3307 282	1 280
DP2/3H	32,2703 921	1 914	DSALMOUT	0011 59	22 2291100 =	DSPOCTWD	05,3222 279	3 251 277
DP2(-3)	30,3200 843	- - -	DSEXIT	0104 19	3 280 281 =	DSPOUT	12,2066 107	2 106
DP3OUTSF	04,2674 264	1 262	DSKYCHK	37,3633 1098	11098	DSPOUT	E4,1602 35	- - - =
DP3/80	32,2667 921	1 914	DSKYCODE	37,3616 1098	11099	DSPRTRN	12,2100 107	2 107
DPA	33,3503 738	1 729	DSKYRSET	12,2023 104	1 108	DSPSCAN	12,2100 107	2 107
DPB	33,3505 738	1 729	DSKYWAIT	37,3605 1099	210991100	DSPSFNOR	05,2507 261	1 261
DPBIT14	01,3651 1074	11073	DSLV	04,3273 281	2 281	DSPTAB	0313 22	62 881100
DPC	33,3507 738	1 729	DSMAG	0132 20	2 281 =	DSPTEM1	0337 22	48 209 448
DPDIFF	E6,1545 53	7 578 579	DSMSK	04,3275 281	3 281 285	DSPTEM2	0342 22	28 161 442
DPINCOM	04,3056 273	1 273	DSP2BIT	05,3255 280	3 256 290	DSPY30	23,3247 447	1 447
DPINORM	04,3064 273	1 273	DSP2DEC	04,3173 279	1 265	DSPYCH30	23,3252 447	1 449
DPINSF2	04,3066 273	1 271	DSPA	05,2340 259	1 252	DSQ	00,3154 1026	1 964
DPINSF	04,3041 273	3 271 273	DSPAB	05,2333 259	1 252	DSQSUB	00,3262 1028	510261033
DPIPAY	E5,1656 46	3 455 459 =	DSPABC	05,2326 259	1 252	DSREL	0131 20	4 280 281 =
DPIPAZ	E5,1662 46	1 455 =	DSPALARM	04,3315 282	11 252 283	DSRUPTEM	0073 14	5 107 =
DP.25	32,2701 921	1 914	DSPB	05,2345 259	1 252	DSRUPTSW	0347 23	5 98 406
DP.5	33,2640 912	6 911 918 =	DSPC	05,2352 259	1 252	DSU	7071 778	1 962
DPOSMAX	7742 997	3 226 654	DSPCNT	0345 22	7 98 107	DT1ITEMP	E4,1663 40	2 741 =
DPOUT	04,2677 264	3 263 264	DSPCOM1	05,2343 259	3 259 260	DT2TEMP	E4,1662 40	4 40 715
DPOUTCOM	04,2710 264	1 264	DSPCOM2	05,2357 259	2 259	DT2TEMPD	E4,1663 40	5 40 715
DPOUTNOR	04,2720 264	1 264	DSPCOM3	05,2365 259	1 259	DT	E6,1542 53	34 99 826
DPS1EQU1	33,3417 737	2 729 738	DSPCOUNT	0270 22	55 98 309	DTA	21,2673 593	2 592
DPS1EQU2	33,2760 729	1 738	DSPDCEND	05,2513 261	2 262 263	DTASK	32,2705 921	1 914
DPS1EQU3	33,3265 734	1 738	DSPDCGET	05,2454 261	1 261	DTCALC	21,2060 575	1 574
DPS2ADR	36,2533 751	1 740	DSPDCPUT	05,2464 261	1 261	DT-LETJT	E3,1743 33	2 66 680
DPSENGON	20,2226 479	5 690 742	DSPDCWD1	04,3145 278	2 278 279	DT-LIFT	E3,1742 33	4 33 675
DPSTART	36,2156 742	1 64	DSPDECWD	04,3117 278	1 261	DTPRD	36,3112 933	1 929
DPTEST1	05,2250 255	3 255	DSPDPDEC	04,2722 264	1 252	DT/2	E4,1562 34	7 767 795 =
DPTEST	05,2236 254	4 254 270	DSPFMEM	05,3614 277	2 252 279	DT/2MAX	07,2243 768	2 767
DPZERO	07,3731 797	2 791 792	DSPIN1	04,3244 281	2 280 282	DT/2MIN	07,2235 768	2 767
DPZEROX	20,3430 610	1 609	DSPIN	04,3217 280	5 241 285	DT/TAU	34,3601 669	1 668
DPZEROY	17,3116 539	1 537	DSPLAY	12,2115 107	1 107	DTW	21,2672 593	2 592
DPZRO	27,3102 727	2 679 725	DSPLAYC	12,2126 107	1 106	DUMMY13	27,3451 762	1 67

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SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F
DUMMYFIL	16,3642 516	2 491 594	EBANK5	5661 1061	7 88 858	ENDDPUSH	6626 971	1 971
DUMMYJOB	5576 1060	4 631059	EBANK6	5632 1061	7 366 858 =	ENDEXTVB	11,2056 201	8 201 206
DUMPDUMP	07,2715 780	- - -	EBANK7	5662 1061	3 692 887	ENDFIND	5572 1050	410521056
DUMPLOC	32,2363 916	- - -	EBANK	0003 12	78 881093 =	ENDGTSAL	35,2614 460	- - -
DV++	37,2522 1085	- - -	ECE1	23,2665 439	1 439	ENDIDLE	4475 289	40 1601097
DV+-	37,2540 1085	- - -	ECE2	23,2670 439	1 449	ENDIMU	13,2664 155	4 116 145
DVCHK	37,2510 1085	- - -	ECE2CADR	23,3356 449	2 439	ENDINST	4505 289	6 244 283
DVCNTR	25,1511 48	24 68 922 =	EDOP	0023 12	8 9511094 =	ENDJOB1	01,3335 1058	11050
DVCON	37,2013 1077	910841091	EDOT	26,1407 49	31 49 765	ENDKMANU	35,3542 671	1 671
DVEXIT	30,2270 823	- - -	EDOTGEN	26,1436 50	- - -	ENDMANU	34,2761 660	1 648
DV-+	37,2547 1085	- - -	EDOTMAX	17,3010 537	1 536	ENDMARKS	13,3217 162	1 162
DV-+,+	37,2557 1085	- - -	EDOTNEG	17,3015 537	1 536	ENDMAXDV	00,2600 1015	210151017
DV--	37,2521 1085	- - -	EDOTP	26,1422 49	9 47 506	ENDMODE	13,2737 156	1 156
DVMNEXIT	1074 26	10 101 823 =	EDOTQ	26,1423 49	12 49 630 =	ENDMONDO	05,3207 277	1 277
DVMNKILL	30,2313 824	- - -	EDOTR	26,1424 49	9 49 631 =	ENDNMTST	04,2142 242	2 242
DVNORM	00,2503 1012	31011	EDOTSIGR	17,2747 536	2 537	ENDNUM	04,2152 242	1 242
DVNORMCT	0127 20	6100910201 =	EDOTUGEN	17,3511 547	2 524 525	ENDNVBSY	04,3535 307	1 308
DVOVF	00,2404 1009	1110111022	EDOTVGEN	17,3515 547	2 524 525	ENDOFJOB	5567 1050	107 711098
DVQXCHK	37,2567 1086	- - -	EDOT(2)	26,1412 49	10 47 549 =	ENDOFUF	37,3144 1091	11091
DV/SC	7670 995	2 995	EDOT(2)Q	26,1412 49	- - - =	ENDPASTE	4442 277	- - -
DVSELECT	1310 29	20 101 824 =	EDOT(2)R	26,1414 49	- - - =	ENDPATCH	32,2327 916	1 924
DVSIGN	0126 20	1010091025 =	EDOT(R)	26,1410 49	3 538 543 =	ENDPRCHG	01,3233 1053	210531059
DVTOTAL	25,1506 48	9 69 826 =	EEEE	14,3252 401	1 402	ENDRADAR	10,3242 197	3 171 182
DVXSC	7507 991	2 990	EGHTH	27,3106 727	1 725	ENDRMODF	4435 170	1 277 =
DWNRPTBB	4061 61	1 60	EIGHT	7760 997	2 544 821 =	ENDROLL	34,3703 671	3 672
DXCH+DIM	37,2331 1082	- - -	EJ1	01,3412 1059	61058	ENDRQDAT	05,2273 255	1 255
DXCRIT	0114 19	2 901 902 =	EJ2	01,3422 1059	11059	ENDRQWT	05,3343 284	1 288
DXCRIT+1	0115 19	- - - =	EJFREE	5566 1050	13 210 396	ENDRSTRT	01,2143 90	2 94
DZERO	36,3272 937	2 740 932	EJSCAN	01,3345 1058	11055	ENDRTOUT	05,2535 262	1 266 =
			ELANG	26,1475 51	1 300 =	ENDRTST	11,2522 214	1 214
E13456789	37,3164 1092	11093	ELEVEN	7764 997	7 91 997	ENDRUTIN	05,3077 271	1 275 =
E1	23,1557 32	6 662 666 =	ELIPLMTS	36,3061 932	1 930	ENDSCALE	04,2774 272	5 272 273
E2	23,1565 32	8 663 666 =	ELOOPPIN	37,3251 1093	210921093	ENDSPOCT	04,3312 282	- - -
E2DPS	24,1400 36	7 36 909 =	ELRCODE	13,3550 229	1 229	ENDSTATE	07,3605 794	1 793
E2DPSL	22,3705 909	1 889	EMP11JOB	24,1602 739	2 909 =	ENDSUMS	37,3503 1096	11096
E4LOAD	24,1751 41	9 41	EMSD	0055 13	- - - =	ENDTASK	5714 1065	4 961071
E	26,1411 49	36 47 631	ENABLE	24,2551 419	1 410	ENDTEST1	24,2250 414	18 411 426
EARRTCOM	14,2210 384	2 383 384	ENDZDEC	04,3216 279	1 280	ENDTEST	14,2770 396	26 380 464
EARTHR	14,2424 389	8 381 464	ENDALL	04,2156 242	1 242	ENDTNON2	12,2421 116	1 115
EARTHTAB	07,3743 798	5 767 798	ENDCOUNT	37,3103 1090	11090	ENDTNON	12,2401 115	1 115
EARTHPRG	35,2725 464	1 464	ENDDISIN	11,3034 221	3 221 222	ENDTPUSH	6630 971	2 971102?
EBANK3	5552 1061	4 224 683 =	ENDDOT	7257 983	11028	ENDTSLC	00,2212 1004	11004
EBANK4	7751 1061	6 675 921 =	ENDDPDEC	04,2740 265	1 271	ENDTST03	23,2767 440	11 438 448

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U UNDEFINED
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J FAILED LEFTOVER WORD
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C CONFLICT IN MEMORY
MM MULTIPLE ERRORS
X MISC. TROUBLE

SYMBOL TABLE LISTING, INCLUDING PAGE NUMBER OF DEFINITION, AND NUMBER OF REFERENCES WITH FIRST AND LAST PAGE NUMBERS

SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H.	DEFINITION	REFERENCES F
ENDUP	31,2351 812	5 327 812	ERASCON4	37,2005 1077	11092	EXECTEM2	0062 14	410511056 =
ENDVBFAN	05,2175 253	- - -	ERASCON5	37,2015 1077	11093	EXEUNT	32,2773 922	2 922
ENDVEX	30,3351 846	1 845	ERASCON6	37,2003 1077	310921093	EXFINAL	22,3043 892	1 877
ENDVLOAD	6561 970	2 972	ERASLOOP	37,3203 1092	410921093	EXIGEND	22,2741 890	1 876
ENDVPUSH	6616 971	- - -	ERASZERO	0007 329	4 329 =	EXIGMID	22,2702 889	1 878
ENDVXV	7046 977	1 993	ERCNT	0107 19	7 246 310 =	EXIT	7021 976	1 954
ENDWATCH	24,2701 421	2 420	ERCOM	04,2427 246	1 246	EXITADR	33,2651 707	3 702 735
ENEMA	01,2354 95	3 683 748	ERCOMP	E5,1771 46	6 390 461 =	EXITEM	0104 19	7 268 269 =
ENGINBIT	7757 481	5 480 853 =	ERCON	04,2442 246	1 246	EXOVFLOW	22,3037 892	1 893
ENGINEON	20,2235 480	1 479	ERCOUNT	1365 30	11078 =	EXQDLIN	22,3017 892	8 876 876
ENGINOF1	20,2277 481	6 481 756	ERCTRANG	23,2771 441	1 439	EXTVBACT	0336 22	6 98 201
ENGINOFF	20,2263 481	11 101 922	ERECTIME	E5,1746 46	4 452 465 =			
ENGLECT	36,2442 748	1 748	ERESTORE	1353 30	8 891093 =	FAIL3	4777 315	1 315
ENGNFAIL	30,2317 824	1 823	ERFINAL	14,2047 381	3 381 398	FAILDISP	07,2112 314	1 314
ENGNOM	32,2110 912	1 911	ERMINUS	04,2421 246	- - -	FAILREG	1360 30	18 88 336 =
ENGOFF1	32,2744 921	1 921	EROPTN	E5,1512 44	6 380 446	FAILTABL	26,2673 573	4 571 572
ENGOFF2	32,2751 922	1 921	ERPLUS	04,2424 246	1 246	FAKESTRT	07,2000 101	1 93
ENGOFF3	32,2757 922	2 921	ERRBZF1	37,2325 1082	11082	FALNE1	24,3147 426	- - -
ENGOFF	32,2714 921	1 917	ERRBZF2	37,2326 1082	11082	FALNE	24,3133 426	3 412 419
ENGOFFDT	E4,1566 35	2 921 =	ERRBZF3	37,2327 1082	11082	FALTOF	4575 303	- - -
ENGOFFSW	0107 15	4 702 922 =	ERRBZF4	37,2330 1082	11082	FALTON	4571 303	5 201 812
ENGONTM	06,3206 372	1 372	ERRBZMF2	37,2212 1080	11080	FBANK	0004 12	31 2891060 =
ENGRESET	06,3170 372	1 373	ERRBZMF	37,2211 1080	11080	FBANKMSK	6341 961	21056 =
ENGRST	06,3225 373	1 373	ERRMASK	24,2360 415	2 415	FBIASSUB	12,3556 868	3 866
ENGSET	06,3217 373	1 373	ERROR	04,2355 245	1 240	FBR3	07,2551 776	1 791
ENGSTART	06,3156 372	1 368	ERRORS	37,2033 1078	4510781091	FBRANCH	E4,1570 35	3 791 795 =
ENGSTEP	E4,1470 43	13 372 373 =	ERRORSUM	E5,1523 48	- - - - =	FC	E5,1570 42	8 336 858 =
ENTER	05,2003 250	1 241	ERTHRYSE	14,2407 389	3 380 465	FCNTR	E4,1404 43	5 370 =
ENTERJMP	04,2051 241	1 240	ERTHSPER	36,3505 941	1 941	FCOLD	E5,1567 42	4 853 855 =
ENTEXIT	0126 250	10 251 286 =	ERUNTIS	24,3653 434	1 428	FCOMPSET	30,3556 853	- - -
ENTPASO	05,2031 250	3 250 288	ERVECTOR	E5,1513 44	2 389	FCS2	06,2742 367	1 367
ENTRET	0126 20	7 244 288 =	ESCAPE2	0127 20	21034103S =	FCS3	06,2740 367	1 367
ENTSET	05,3363 288	1 288	ESCAPE	0126 20	41034103S =	FCSCNTR	E4,1400 43	- - - =
EOTUM	30,2542 833	1 832	ESCPSW	0101 15	5 930 940 =	FCSSTART	06,2736 367	1 211
EQ	E6,1411 49	4 538 545 =	ESTIMS	35,2014 452	2 412 414	FCSTEST1	06,2762 367	1 367
EQU1ADR	33,3467 738	1 733	ETHETA	0071 52	2 595 597 =	FCSTEST	06,2764 367	- - -
EQU2ADR	33,3465 738	1 729	ETHROT	E5,1565 42	25 42 909 =	FCT1	E6,1444 50	6 506 508 =
EQU3ADR	33,3466 738	1 730	ETHROTIL	30,3444 848	1 845	FEEDREST	27,3410 761	3 756 763
ER	E6,1413 49	15 47 630	EVAL	30,2526 833	3 833	FEEDTEST	27,3353 760	1 756
ERASCHK	37,3153 1091	11079	EVEN	36,3370 939	1 939	FETCHCDU	15,2410 338	1 339
ERASCON1	37,2001 1077	11092	EVEX	E5,1544 42	10 42 842 =	FEXTRA	30,3536 852	1 855 =
ERASCON2	37,2002 1077	11092	EXECBANK	5575 1050	410491060 =	FIFTY1	20,3754 626	1 618
ERASCON3	37,2004 1077	11091	EXECTEM1	0061 14	410491056 =	FIFTY1R	20,3457 618	1 626

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SYMBOL TABLE LISTING, INCLUDING PAGE NUMBER OF DEFINITION, AND NUMBER OF REFERENCES WITH FIRST AND LAST PAGE NUMBERS

SYMBOL H	DEFINITION		REFERENCES F	SYMBOL H	DEFINITION		REFERENCES F	SYMBOL H	DEFINITION		REFERENCES F
FIFTY2	20,3756	626	1 619	FLAG1DWN	0067	830	22 76 833	FSTEP4	30,3434	848	- - -
FIFTY2R	20,3472	619	1 626	FLAG1UP	0051	830	8 76 833	FSTEP	30,3414	848	1 845 =
FIFTY3	20,3760	626	1 621	FLAG2DWN	0076	830	11 100 857	FSTRSAMP	11,2410	212	1 211
FIFTY3R	20,3551	621	1 626	FLAG2UP	0060	830	9 670 858	FTEST	17,2774	536	1 537
FILDELV	E5,1644	46	7 459 460 =	FLAGWRD1	0075	15	35 93 853 =	FULLCSP	20,3126	587	1 587
FILDUMMY	20,3033	585	2 519 594	FLAGWRD2	0076	15	31 3201065 =	FULLDSP1	05,3456	310	1 310
FILFIRST	21,2322	580	2 574 634	FLAGWRD4	0100	15	2 921 922 =	FULLDSP	05,3455	310	1 310
FILINADR	21,3643	633	1 633	FLASHOFF	4626	304	5 207 446	FUNCTION	E6,1521	52	6 552 604
FILSTART	21,2041	575	3 633 634	FLASHON	4622	304	17 1601097	FV	E4,1502	34	10 787 796 =
FILTAD	30,2175	820	1 819	FLAIOUT	30,3613	855	1 854	FVACCADR	06,2003	63	2 71 75
FILTAXIS	21,2267	579	- - -	FLPASSO	E4,1402	36	5 36 888 =	FWEIGHT	E5,1576	42	7 850 856 =
FILTEND	32,3047	924	- - -	FLTYAXIS	21,2121	576	1 576	FXADRS	37,3377	1095	21096
FILTER	21,2015	574	2 581 820	FLTZAXIS	21,2113	576	1 575	FXFX	37,3363	1095	11096
FILTINIT	21,2000	574	1 633	FLVELVN	11,3077	222	1 221	FXF2	23,3303	448	1 449
FILTMS50	21,3645	633	1 633	FMINCALC	17,3021	537	2 537	FXF2CADR	23,3357	449	- - -
FINALDV	00,2601	1016	310091015	FNZEROFN	23,3271	448	4 437 438	FXFDSP	23,3317	448	1 448
FINALI	0354	23	3 222 300	FOLD	E5,1565	42	5 853 857 =				
FINDCDUD	30,2703	838	5 708 912	FOLDCALC	30,3547	853	1 852	G21	E3,1605	32	2 661 =
FINDKEY	13,3254	163	1 163	FORCETRM	E6,1746	56	1 522	GAIN	32,2404	917	3 701 915
FINDNAVB	14,2135	383	3 380 407	FORGETZ	07,2014	101	2 101	GBIASX	E3,1444	30	1 296 =
FINDSIGN	16,3356	509	2 507 509	FORGETIT	07,2007	101	4 313 824	GCOMP1	12,3464	865	1 865
FINDTIME	06,2454	72	2 72	FORTYTWO	07,2370	172	2 170	GCOMP	E3,1455	31	28 31 868
FINDVAC2	01,3063	1051	210491050	FORVEL	0357	23	4 110 440	GCOMPER	16,3027	504	1 504
FINDVAC	5516	1049	32 631049	FOUNDR	E4,1430	34	1 783 =	GCOMPSUB	12,3351	863	6 862
FINEALGN	23,3123	444	1 448	FOUNDV	E4,1436	34	1 783 =	GCOMPSW	E3,1463	31	9 861 868
FINEK2	11,2223	206	1 208	FOUR	7761	997	31 891077 =	GCOMPUTE	21,3426	629	1 630
FINETIME	5026	410	6 224 442	FOURJETS	16,2705	501	1 501	GCOMPUTR	21,3503	630	1 631
FINEZERO	23,3216	446	2 438	FOURTEEN	00,3130	1024	11022	GCOMPZER	12,3606	868	1 452
FINISH	24,2241	414	1 433	FPQR	E6,1441	50	8 536 537	GDESELCT	13,2661	154	1 150
FIRSTADR	21,2013	574	- - -	FPQRMIN	E6,1460	50	7 536 537	GDOTM1	E4,1610	37	4 37 895 =
FIRSTCOG	36,3041	931	1 930	FREDSPDO	04,3543	909	1 909	GDOTM1T	E4,1532	37	2 895 =
FIRSTIME	12,2240	110	- - -	FREEDSP	4724	308	15 2011098	GDT1/2	1064	26	2 842 913
FITHCMD	36,2354	747	2 746	FREE-R	33,2330	702	1 701	GDT/2	1024	26	4 685 843
FITHGCMD	36,2374	747	1 747	FREERET	0134	21	2 308 =	GDUM	0032	37	2 895 904 =
FIVE	7766	997	18 991077	FREEWAIT	04,3536	909	1 908	GDUMCLL	22,3521	904	2 895 897
FIVESECS	11,2264	215	1 215	FROLLNEG	34,3735	672	1 672	GDUMPRES	E4,1602	37	4 37 895 =
FIXCLPAS	04,2270	244	- - -	FROLLPOS	34,3726	672	- - -	GEADDR	6202	956	1 956
FIXDELAY	5701	1064	67 142 757	FROMROOT	17,2500	529	1 589	GEFF	E4,1510	38	4 701 919 =
FIXLOC	0110	19	50 3641053	FRSTTIME	36,3544	942	1 942	GENDDV	00,2544	1014	210131011
FIXLSTCA	15,2176	333	1 333	FRSTZERO	26,3114	615	1 615	GENPL	E5,1570	45	46 45 426
FIXLSTCI	15,2202	333	1 333	FSTEP1	30,3420	848	1 848	GENPLAD1	14,3713	409	- - -
FIXRANGE	04,2632	263	1 262	FSTEP2	30,3424	848	- - -	GENPLAD	24,3655	434	1 415
FIXROOT	00,3434	1030	31029	FSTEP3	30,3430	848	- - -	GENPLADR	14,3714	409	- - -

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SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F
GENSCL	00,2345 1008	21008	GIMBLON	30,2351 825	- - -	GOTOGE	6753 975	1 975
GENSCR	00,2277 1007	41006 1026	GIMBLIRY	17,2651 533	1 542	GOTOGTS	21,3604 632	2 521 534
GENSHFT2	00,2224 1005	11005	GIMLOCKI	15,2731 347	1 346	GOYFILTR	21,2116 576	1 579
GENSHIFT	00,2214 1005	1 994	GIVENI	E4,1560 34	1 779 =	GPMATRIX	20,2000 136	1 135
GEOBAVR	35,2715 463	1 463	GL+NOAIT	04,2444 246	1 245	GRABDSP	4632 306	3 314 1094
GEOBND1	5661 466	- - - =	GLAMPIST	12,2606 121	1 121	GRABLOCK	0330 22	11 98 309
GEOBND	5352 466	3 466 =	GLIFTOFF	E3,1764 33	1 454 =	GRABUSY1	04,3472 306	1 240
GEOCOMPS	E5,1742 46	8 411 471 =	GLINVERT	12,2577 121	1 121	GRABUSY	4642 306	1 306
GEOCONS1	35,3335 471	2 459	GLOCKCHK	12,2544 120	2 120	GRABUSYB	04,2000 240	1 306
GEOCONS2	35,3337 471	1 459	GLOCKMON	12,2537 120	1 118	GRABWAIT	4644 306	16 204 447
GEOCONS3	35,3341 471	2 460	GLOCKOK	5733 131	4 121 =	GRP2OFF	27,3264 757	1 756
GEOCONS4	35,3345 471	1 460	GMBLBITS	15,3723 366	1 366	GRRFLAG	0034 15	1 472 =
GEOIMUIT	24,2014 411	1 471	GMBLMNAD	6105 831	1 479	GRRNOW	35,3401 472	1 454
GEOMIRX	E5,1747 46	6 433 461 =	GMERGE	13,2540 152	1 154	GRRPLACE	27,2000 674	1 319
GEORGEB	24,3731 435	1 412	GMLCKCHK	14,2762 396	2 380 397	GSELECT	13,2473 151	3 150
GEORGEC	24,3723 435	1 412	GMLOCKCK	24,3132 425	- - -	GSHIFT	7653 994	1 962
GEORGED	24,3715 435	1 412	GMODE10	07,3315 788	1 786	GTABLE	07,3244 786	1 786
GEORGEJ	35,3330 471	2 457 461	GMODE11	07,3276 788	1 786	GTHRSHLD	30,2365 825	1 825
GEORGEK	35,3332 471	3 458 459	GMODE12	07,3241 787	1 786	GTS2CADR	21,2406 581	3 574 580
GEORGES	24,3511 431	- - -	GMODE	E4,1572 35	2 784 786 =	GTS	21,2572 591	2 581 820
GEOSAVED	E5,1716 46	4 453 465 =	GOAGN	12,2260 110	1 110	GTSAD	30,2126 820	1 819
GEOSIRT4	35,2710 463	1 68	GOBB	4054 61	1 60	GTSCPSS	35,3351 471	1 210
GETADR	20,3773 628	1 628	GODAPGO	7751 474	8 215 716 =	GTSFIN	23,2045 295	1 270
GETCADR	01,3670 1074	11074	GODSPALM	05,2324 256	10 250 268	GTSFINLC	05,3042 270	1 271
GETCNTR	17,2157 522	1 628	GOGIMBAL	17,2124 521	1 521	GTSFOUT	23,2037 295	1 261
GETDET	13,3115 160	1 160	GOGTSADR	17,2674 534	1 534	GTSFOUTL	05,2511 261	1 261
GETINREL	04,2213 243	4 241 248	GOLOADLV	11,2261 207	4 200	GTSMNITR	E6,1745 56	4 521 635
GETMAXDT	07,2206 767	1 767	GOLOC	0735 76	29 71 75 =	GTSQAXIS	21,3005 595	1 634
GETMKS	13,3054 160	4 159 160	GOMASS	30,2161 821	1 821	GTSRAXIS	21,3000 595	1 593
GETNEWNM	4232 82	1 82	GONXTBNK	37,3475 1096	31096	GTSTEST	21,2674 593	1 591
GETNEWX	07,2725 780	1 780	GOODEND	13,2720 156	5 155 671	GTSWTLST	E5,1745 46	6 452 685 =
GETPART2	06,2414 71	1 63	GOODKALC	33,3047 730	1 730	GUDENTRY	24,2474 418	1 418
GETPLTIM	14,2440 389	1 389	GOODMANU	34,3710 671	1 660	GUESS1	24,2223 414	- - -
GETPRIO	4226 82	2 82 85	GOODRAD	10,2772 190	1 191	GUESS	24,2056 412	- - -
GETRANDV	07,3036 783	2 780	GOON	01,2007 88	1 88	GUESSW	0077 15	4 912 930 =
GETSMART	16,2535 496	1 496	GOPROG2	01,2275 93	2 95 102	GUIDANCE	33,2530 705	1 705
GFACT	26,3173 616	1 613	GOPROG	01,2163 92	2 60 61	GWAKE2	13,2373 148	1 149
GFKNOWN	33,2307 701	1 914	GOQ	05,2712 268	1 269	GWAKE	13,2434 149	1 149
GIMANGS1	14,2242 384	2 383 384	GOQADR	21,3720 634	1 634	GYROAGRE	13,2406 148	1 148
GIMBAL	21,2603 591	1 579	GOQIRIMG	21,3003 595	1 634	GYROBUSY	13,2427 149	1 148
GIMBLBTS	26,3125 615	2 615	GOSHOSUM	11,2404 211	1 200	GYROCMD	0047 12	5 125 153 =
GIMBLMON	30,2327 825	1 831	GOTO	6724 974	13 975 1042	GYROCTR	0047 12	3 420 436 =
GIMBLOFF	30,2357 825	3 825	GOTOERS	6740 975	1 974	GYROD	E5,1521 44	1 434

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GYKODPL	24,3656	434	- - -				ICORK2	11,2141	204	2 205				IMUMON	12,2305	112	2 108		
GYKOEXIT	13,2577	153	1 153				ICSDEL	11,2154	205	1 204				IMUOP2	12,2713	126	1 126		
GYKOFRAC	13,2662	154	2 152 154				IDADIIEM	0140	21	4 254 294				IMUOP	12,2702	126	1 131		
GYKSFIST	24,2451	418	1 210				IDAD2IEM	0141	21	2 294				IMUPULSE	13,2362	148	5 206 865		
GYTOBETO	E5,1616	45	2 410 436	=			IDAD3IEM	0142	21	- - -				IMUSE	0007	15	- - -		=
H1	E4,1532	38	3 916 917	=			IDADDTAB	23,2406	300	2 294				IMUSEFLG	7754	158	7 116 396		=
H	E4,1564	34	8 776 795	=			IDADDIEM	0132	20	- - -		=		IMUSTALL	13,2751	157	30 203 865		
HALF	7746	997	32 1731046	=			IDLEADR	01,2603	99	1 93				IMUTEST	24,2000	411	1 210		
HALFA	34,2413	653	15 645 666				IDLERADR	16,2164	490	1 490				IMUZERO2	13,2045	140	1 138		
HALFCIRC	36,3245	937	1 936				IDNCDUN	01,2557	99	1 90				IMUZERO3	13,2055	140	- - -		
HALFDP	15,3074	351	3 342 358				IERASIST	6171	956	1 956				IMUZERO	13,2000	138	10 203 446		
HALFY	1130	27	3 271047				IFAILINH	01,2571	99	1 92				IMUZEROA	13,2010	138	1 138		
HBRANCH	E4,1571	35	4 783 794	=			IFAILJMP	12,3021	131	1 113				IMUZEROK	11,2110	203	1 201		
HC	0105	15	5 702 918	=			IFAILOK	13,2273	145	2 89 145				INCLOOP2	11,2170	205	1 205		
HDAP	E6,1444	50	7 50 550				IG	E3,1634	32	5 661 663		=		INCLOOP	11,2163	205	1 205		
HI10	13,3611	230	1 229				IGC	E5,1502	44	2 340 347				INCORPEX	E4,1603	35	- - -		=
HI5	4560	303	6 1071096				IGN+28	07,2442	173	1 173				INCR	01,2670	1039	1 963		
HIFSTEP	30,3440	848	- - -				IGNALG	22,2034	876	1 909				INCRCDUS	15,3566	363	- - -		
HIGH4	5351	998	3 957 974				IGNALGL	22,3706	909	2 875 879				INCRCHK	37,2423	1083	- - -		
HIGH9	6340	961	1 957				IGNITN1	22,3077	894	1 878				INCRDCDU	34,3524	668	2 668 670		
HIGUESS	5447	1047	11047				IGNITN2	22,3172	896	1 878				INDEP	E3,1722	33	10 931 943		
HISCALAR	0003	59	1 410		=		IGN-2SEC	07,2421	173	1 172				INDERASE	6252	957	1 957		
HISLOPE	30,3441	848	- - -				IGNTEST	33,2465	704	1 704				INDEX2	6230	957	1 957		
HISPMAX	11,2475	213	1 212				IM30INIF	01,2570	99	1 89				INDEX	6212	957	1 955		
HITHRESH	30,3770	858	1 857				IM30INIR	01,2572	99	1 93				INDEXLOC	0120	20	12 957 1040		=
HIVXSTEP	30,3442	848	- - -				IM33INIT	01,2573	99	1 98				INDJUMP	6343	962	6 956 959		
HOLDCDUY	E6,1740	56	3 56 633				IMEDIATE	06,2473	172	4 172 174				INDPCT	36,2305	745	1 745		
HOLDCDUZ	E6,1741	56	- - -		=		IMODES30	0365	23	60 89 487				INDWORK	6250	957	1 957		
HOLDR	32,2241	915	1 915				IMODES33	0366	23	20 98 421				INERCONA	26,3154	616	1 612		
HOLDRATE	20,2072	475	2 476 699				IMUATTCK	11,2565	216	1 200				INERCONB	26,3145	615	1 612		
HOMAGAIN	21,3646	633	2 633 634				IMUBACK	24,2025	411	1 210				INERCONC	26,3136	615	1 612		
HOMELOOP	21,3650	633	1 633				IMUBAD	13,2672	155	4 116 155				INERCTR	E6,1620	54	4 612 613		
HULLSLIM	16,3757	518	1 506				IMUCADR	0367	23	2 98 155		=		INERCTRX	E6,1621	54	6 612 613		
HYPTRIG	30,3250	937	1 936				IMUCAGE	12,2663	125	1 131				INHNTCHK	37,2766	1089	11088		
I=1	26,2355	325	- - -				IMUCOARK	11,2132	204	1 201				INITZDPS	22,2000	875	1 875		
I=2	26,2405	326	1 326				IMUCOARS	13,2065	141	7 204 447				INITDSP	5567	71	1 71		=
I=3	26,2365	326	- - -				IMUCOARV	11,2133	204	2 204 207				INITINT	07,2324	170	3 766 771		
I=4	26,2417	326	2 325 326				IMUFAIL	12,2753	130	1 131		=		INITREAD	10,2654	188	6 187		
I=4.CONT	26,2440	326	1 69				IMUFINE	13,2252	145	5 206 444				INITSW	01,2056	89	1 89		
IBNKCALL	5270	950	87 90 922				IMUFINED	13,2271	145	2 145 150				INITV	36,3602	944	1 932		
ICDUFAIL	12,2753	130	1 131		=		IMUFINEK	11,2204	206	1 200				IN-OUT1	37,3003	1089	210791089		
							IMUFINEV	11,2233	206	1 206				IN-OUT2	37,3015	1089	- - -		
							IMUGOOD	13,2671	155	- - -				IN-OUT3	37,3031	1089	- - -		

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SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F
INLINK 0045	12 2 98 229 =	ITEMP2 0062	14 45 14 822	.5ACCMNU	E6,1636	54 - - - =
INPAKAB 20,2225	479 1 479	ITEMP3 0063	14 27 14 708	.5ACCMNV	E6,1637	54 - - - =
INREL 0127	20 22 241 248 =	ITEMP4 0064	14 22 14 631	.5-.5COF	0062	57 3 608 =
INRELIAB 04,2217	243 2 243 247	ITEMP5 0065	14 24 14 708	.64	21,2376	581 1 575
INSERT17 17,2011	519 3 521	ITEMP6 0066	14 21 51 603	.66667	21,3304	600 1 597
INSERT20 20,2231	479 1 522	ITERATOR 36,3513	942 1 931	.68387	16,2231	491 1 489
INSERT21 21,2700	593 1 635	ITERSW 0076	15 3 929 942 =	.6DEG/SC	17,3507	546 1 551
INSRT16A 16,2265	492 6 497	ITRO 6437	965 - - -	.707	17,3525	547 3 545 547
INSRT16B 16,2101	488 2 495	ITR10 6206	956 - - -	.707GTS	21,3305	600 2 598
INSRT20A 20,2310	481 - - -	ITR11 6246	957 - - -	.707P	16,2221	491 - - -
INSRT21A 21,3611	632 - - -	ITR12 6200	956 - - -	**********		
INSRTADR 17,2171	522 1 522	ITR13 6257	958 1 957	-0CHK	37,2050	1078 8 10821091
INTB15+ 0104	19 3 19	ITR14 6303	959 - - -	-15DEGS	12,2612	121 1 120
INTBIT15 0105	19 7 19 957	ITR15 6167	956 - - -	-1CHK	37,2056	1078 4 11080 1097
INTEGRSW 0106	15 2 700 773 =	ITR1 6426	965 - - -	-1.5CSP	17,2555	530 1 529
INTGRATE 07,3462	791 1 791	ITR7 6325	960 - - -	-1.5CSPQ	17,3500	545 2 548 550
INTLZE 12,2254	110 1 110	ITSAJOB2 06,2610	75 1 73	-1/12	07,2776	781 1 790
INTMCTBS 05,2100	251 2 251	ITSAJOB 06,2510	73 1 72	-1/2+2	00,2442	1011 1 1030
INTOUT 07,2544	775 1 769	ITSAIBL 06,2513	73 1 71	-1/8	5502	1048 2 1721047
INTPRET 0112	953 110 181 974	ITSAVAR 06,2424	71 1 71	-1SEC214	27,2502	685 1 685
INTRSM 0122	953 11055	ITSAWAIT 06,2443	72 1 72	-2JETLIM	E6,1500	51 8 51 525
INTRIN 36,2032	740 1 65	ITSEVEN 06,2616	75 1 73	-2MIN256	21,3401	603 - - -
INTVAL 35,3305	470 3 452 455	ITSINDIR 4064	72 1 72	-2MINWL	21,3400	603 - - -
INTVEC E5,1646	46 3 459 460 =	ITSLGCL1 4073	74 2 74 75	-35AT16	16,3554	515 1 507
INTY E5,1624	46 9 46 457 =	ITSLGCL2 06,2551	74 1 74	-45DEGSR	10,2137	174 1 174
INTZ E5,1630	46 2 457 =	ITSLIKEB 06,2475	73 1 71	-50DEGSR	10,2140	174 1 174
INVACC 20,3762	627 5 618 621	ITSLNGCL 06,2576	75 1 71	-5DEG+1	16,3555	515 1 506
INVACCSQ E6,1513	51 13 550 551	ITSWTLST 06,2603	75 1 74	-70DEGS	12,2611	121 1 120
INVLOOP 20,3441	618 1 620	ITURNON2 12,2656	124 2 123 126	-80DEGSR	10,2141	174 1 174
INVRATE 34,3756	672 1 672	ITURNON 12,2633	123 1 131	-90MS	17,2573	531 - - -
INZONE4 17,3576	548 1 548	IXX E6,1452	50 5 612 614	-A2JTLIM	16,3574	515 - - -
IRIG1 12,3346	863 2 861 863	IYY E6,1453	50 2 613 614	-ARATEDB	16,3575	515 - - -
IRIGCOMP 12,3267	862 - - -	IZZ E6,1454	50 2 613 614	-BIT10	12,3051	131 1 127
IRIGX 12,3271	862 - - -	**********		-BIT12	5502	172 1 172 =
IRIGY 12,3305	862 - - -	.075DEC 16,2237	491 - - -	-CCSPR	01,3357	1058 1 11059
IRIGZ 12,3321	862 - - -	.166... 15,3112	351 1 346	-COM-6.5	16,3564	515 1 502
IS-II-ON 30,3367	853 1 853	.1DPS 16,3561	515 2 509	-COMMAX	13,3002	158 2 142 144
ISSUP 12,2434	116 - - -	.1-.05K 0061	57 4 608 610 =	-COMMAX-	13,3003	158 2 142 144
ISSWOFF 12,2766	129 - - -	.1-.05K) 21,3403	603 1 602	-D2JTLIM	16,3573	515 - - -
ISSWON 12,2776	129 1 129	.5ACCMIN 16,2234	491 2 507 508	-DELAYT	20,3212	588 1 589
ISWCALL 5274	950 - - -	.5ACCMNE E6,1633	54 15 54 550	-DIF	11,3075	222 2 222
ISWRETRN 5303	950 1 680	.5ACCMNG E6,1634	54 - - - =	-DRATEDB	16,3572	515 - - -
ITEMP1 0061	14 88 14 870	.5ACCMNR E6,1635	54 - - - =	-ELK	01,2565	99 1 92

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SYMBOL H	DEFINITION		REFERENCES	F	SYMBOL H	DEFINITION		REFERENCES	F	SYMBOL H	DEFINITION		REFERENCES	F
-ENDERAS	6342	961	1 956		-X+B	17,2604	531	- - -		JILST	16,3402	512	2 512 531	
-ENDVAC	6315	960	2 956 975							JILSTADR	17,2605	531	1 530	
-FMAX	30,3700	857	2 846 852		JOFS2	22,3634	907	- - -		JIOP	06,3046	369	1 369	
-GYROMIN	13,2560	152	2 152 154		JOXS2	22,3605	906	1 905		JIPOLADR	17,2454	528	1 528	
-.02R/S2	20,3753	626	3 618 621		J2FS2	22,3672	908	- - -		JISAREON	17,2531	530	1 529	
-.04266	21,2777	595	1 595		J2REQSQ	07,3713	797	1 790		JISATCHG	16,1472	51	11 502 561	
-.06ACC	20,2224	479	1 479		J4REQ/J3	07,3725	797	2 789 790		JISB4T6	16,3540	514	1 514	
-.06R/S2	16,1655	54	6 479 625		JDS2	22,3605	905	1 884 =		JISFIRST	16,3451	513	1 513	
-.08882	21,3057	596	2 596		JDUM	0024	37	3 894 903 =		JISONNOW	16,1471	50	16 502 594	
-.88975	17,2570	531	- - -		JETABORT	07,2113	314	1 556		JUMPLOAD	24,2076	412	1 412	
-LOCKIT	30,3536	852	2 852 854		JETENTRY	4750	313	1 314		JZERO	34,3410	666	1 666	
-LOKONFG	11,3006	220	1 220		JETLWADR	16,3605	515	- - -		JIRETSQ	30,3172	843	1 842	
-MAXDELV	30,2233	822	1 821		JETOFF	06,3035	369	1 370						
-MKREJ	01,2566	99	1 92		JETOFFTM	24,1460	43	1 370 =		K1	23,1601	32	5 32 661 =	
-MS35A14	17,3504	545	1 548		JETON	06,3060	370	1 369		K2	23,1607	32	4 32 661 =	
-MUDT	30,3174	843	1 842		JETONIM	24,1430	43	1 369 =		K2CNTRAL	0062	52	2 596 597 =	
-NMBR	37,3078	1090	11090		JETRAIL	26,1604	53	4 53 494		K2THETA	0070	52	3 597 598 =	
-NMBRS	37,3133	1091	11091		JETRATEQ	26,1605	53	6 488 588 =		K3	23,1615	32	4 32 661 =	
-OCT10	6266	959	1 959		JETRAIER	26,1606	53	6 488 588 =		K3S1	34,2431	653	2 663	
-ON	04,2321	244	3 244 279		JETRESET	1162	28	4 88 571		K4	34,2433	653	1 664	
-PHASE1	1077	27	7 84 857		JETS+X	25,3014	719	3 688 715		K4SQ	34,2435	653	1 663	
-PHASE2	1101	27	2 102 757		JETSET	30,3750	858	1 857		K	0061	57	3 607 =	
-PHASE3	1103	27	1 102		JETSOFF	16,2772	503	6 498 509		KALC4AD	33,2661	707	1 700	
-PHASE4	1105	27	1 102		JETSON	17,3730	551	1 631		KALCLOOP	16,2267	492	1 493	
-PHASE5	1107	27	2 819		JETSTART	06,3023	369	1 367		KALCMAN3	34,2067	646	4 645 764	
-PHASE6	1111	27	1 102		JETSTEP	24,1407	43	24 367 376 =		KALCROLL	34,3714	672	1 671	
-RATBD+1	21,2730	593	2 593		JETTORK4	26,1436	50	1 489		KCENTRAL	0061	52	8 595 633 =	
-RATEDB	26,1501	51	8 524 525 =		JETTSUB	20,3140	587	2 587		KCDEFCTR	26,1650	54	9 478 609	
-RATLM+1	17,2713	534	- - -		JF3	06,3073	370	1 370		KEEPGOIN	32,2450	918	2 921 922	
-RKLIMIT	10,2222	176	2 176		JFAIL1	06,3101	370	1 370		KEL	23,1557	32	11 645 668 =	
-SENSTAB	20,2666	564	1 557		JFAIL	06,3117	370	1 370		KEPLER	07,2565	777	- - -	
-SIGN	37,3703	1099	11099		JFAILCK	06,3066	370	- - -		KEPSILON	07,3673	797	1 780	
-TAN22.5	17,3325	542	2 539 540		JFBUF	24,1403	43	2 370 =		KEYCOM	13,3503	228	1 229	
-TGBND+1	21,2727	593	2 593		JOBAXES	0144	57	22 618 624 =		KEYRPTBB	4057	61	2 60 61	
-TJMIN16	17,3502	545	3 545 551		JOBSLEEP	5545	1050	14 149 765		KEYRUPT1	13,3474	228	2 60 61	
-TJMINQR	17,3502	545	- - - =		JOBSLP1	01,3244	1055	11050		KEYTEMP1	0073	14	7 61 230 =	
-TJMINT6	16,3577	515	1 498		JOBSLP2	01,3253	1055	11057		KEYTEMP2	1076	26	2 229 230 =	
-UP	00,2574	1015	11014		JOBWAKE2	01,3255	1056	11050		KILLAVEG	17,2266	524	2 522 523	
-XBND+1	17,2714	534	2 534		JOBWAKE3	01,3267	1056	21056		KILLCAD	07,2101	103	1 101	
-XPOLICY	20,2456	559	1 559		JOBWAKE4	01,3261	1056	11056		KILLMON	05,3153	476	2 276	
-XSENSE	20,2422	557	1 555		JOBWAKE	5551	1050	12 150 765		KILLPAIR	26,2653	573	1 571	
-XTRANS	17,2443	528	1 528		JSTEPADR	06,3012	368	1 367		KILMONON	4466	689	2 284 287	
-X+A	17,2603	531	- - -		JSWITCH	0001	15	3 791 794 =		KKKK	14,3715	409	1 402	

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SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F
KLMNFLTR	21,2135 577 - - -	LATERJET	20,2543 561	2 559 560	LIMSQR	21,3457 629	2 630	
KODU	24,3310 428	1 428	LATITUDE	E5,1510 44	6 389 412	LINCR	0102 334	1 334 =
KONENOW	20,3402 609	1 607	LATVEL	0360 23	3 110 440	LING0F	22,2061 876	- - -
KPIP1	30,3164 843	2 685 843	LAXIS	E4,1470 38	2 914 920 =	LING1F	22,2070 877	- - -
KPIP	30,3162 843	1 844	LBUF2	00,2466 1011	210331035	LING2F	22,2106 877	- - -
KQZ	E6,1527 52	1 614 =	LDANZIG	00,3674 1035	11034	LING3F	22,2115 877	- - -
KQ	E6,1526 52	5 52 614	LDATALST	E7,1400 47	8 330 332	LINGUID	22,3326 898	1 878
KR1	E4,1436 38	3 701 920 =	LDNCDUGO	15,2424 339	1 338	LINSET	22,3317 898	1 898
KRIEST	33,2634 707	1 701	LDNCDUS	11,2363 215	1 215	LITESOUT	37,3740 1100	11099
KR2	E6,1531 52	1 614 =	LDNPAZE1	15,2423 339	1 339	LLMPRS2	01,2561 99	1 93
KR	E4,1460 38	3 701 920 =	LDNPHAS1	01,2553 98	1 90	LLMPRS	12,2147 108	1 106
KRDAP	E6,1530 52	1 614 =	LDNTMGO	01,2554 99	1 90	LMPBBANK	1147 28	2 800
KREST	33,2632 707	1 701	LDSKYRS	12,2146 108	1 107	LMPBIT=1	26,2637 572	1 571
KT	E7,1626 48	1 917	LEAVASIS	16,2516 496	1 496	LMPCMD	1133 27	22 89 799
KTIMEN+1	07,2654 779	1 780	LEFTS	4541 302	5 2601096	LMPEXIT	5121 800	1 800
			LEFT7COM	04,3075 273	1 273	LMPGROUP	0002 799	- - - =
L	0001 12	246 721097 =	LEFT	00,2341 1008	11005	LMPIN	1143 27	6 89 800
LABNBAZ	24,3674 434	- - -	LEFT-	00,2336 1008	11005	LMPJFAIL	0101 15	7 88 572 =
LABNBVER	24,3706 434	- - -	LEGALIST	04,2506 247	2 247	LMPOUT	1144 28	9 89 106
LAMBERT	36,2625 929	1 921	LEMLAB1	14,3037 397	1 397	LMPOUTT	1145 28	6 89 106
LAMBSET	32,2711 921	1 916	LEMLAB	14,3003 397	2 380 447	LMPPHASE	1102 799	- - - =
LAMPREP	32,2244 915	- - -	LEMMASS1	0144 42	- - - =	LMPRESET	12,2013 104	2 99 108
LAMPRIO	E4,1451 38	3 911 916 =	LEMMASS2	E7,1776 42	4 692 748	LMPRET	1146 28	3 800
LAMPTEST	12,3032 131	2 121 122	LEMONM	0056 13	- - - =	LMPRST	5123 800	1 800
LANDMARK	E3,1500 31	2 296	LENGTHOT	E5,1527 44	14 412 471	LMPRUPT	01,2255 93	1 93
LARGE2	00,3070 1023	21022	LESCHK	01,2560 99	1 98	LMPTBASE	1115 799	- - - =
LARGE3	00,3052 1023	11022	LGCL2CDR	5751 1073	11073	LN2/128	36,3657 945	1 938
LARGE	00,3043 1022	11022	LGCLCADR	06,2002 63	1 75	LNGCALL2	01,3634 1073	11073
LARMLARM	07,2103 314	1 315	LGCOMP	12,3455 865	3 861 868	LNORMT4	4276 104	4 90 104
LASINEX	00,3612 1034	11034	LGWAKE	13,2444 149	2 149 150	LOADCNTR	21,3612 632	2 603 604
LAST30	E7,1557 47	3 217	LGYRO	0356 23	14 98 460	LOADFLAG	24,2644 420	1 420
LASTBIAS	12,3575 868	2 68 817	LGYROBIN	11,2300 208	1 206	LOADGTSM	24,3621 433	2 412 413
LASTGTS	35,2621 460	1 472	LIFTFIX	27,2453 685	1 685	LOADIC	24,2324 415	1 415
LASTLRDT	10,3231 196	1 195	LIFTFIX1	27,2446 685	1 472	LOADIT	24,2743 422	- - -
LASTPER	E6,1463 50	1 488	LIFTOFF	27,2223 680	2 64 675	LOADLV1	05,2002 250	1 207
LASTQUER	E6,1464 50	1 488	LIGHTSET	01,2201 92	1 92	LOADLV	05,2663 268	7 250 270
LASTRER	E6,1465 50	1 488	LIMITS	7744 997	5 3621046 =	LOADSTAT	0305 22	5 268 290
LASTSEG	13,2570 153	1 153	LIMOMG	30,2701 838	1 839	LOADSTDT	35,3025 466	2 454 466
LASTTEST	16,3326 509	1 508	LIMRATE	16,3067 504	2 504	LOADTIME	15,3454 360	5 389 918
LASTTIME	01,3653 1074	- - -	LIMRETQ	21,3437 629	1 629	LOADXSM	35,3044 467	2 432 467
LASTXCMD	0362 23	5 110 365	LIMREIR	21,3514 630	1 629	LOC	0154 21	42 1561060
LASTYCMD	0361 23	6 110 365	LIMSGP	16,3042 504	1 505	LOCCTR	0064 14	24 1561056 =
LATAZCHK	14,2553 392	3 380 418	LIMSQQ	21,3455 629	2 629	LOCK	24,3122 425	1 425

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LOCKANGL	34,2443	653	2	646			LOW4	5343	998	3	2101043			LSTBNKCH	37,3530	1097	11096			
LOCSKIRT	34,3006	661	7	648	650		LOW5	4556	303	11	228 280			LSTEMPTY	04,3552	309	1	309		
LOCTHETA	15,3601	363	1	363			LOW6	05,3401	288	3	275 288			LSTFULL	04,3554	309	3	306	307	
LODMIXNN	23,2016	294	1	294			LOW7	5342	998	7	761055			LSTPTR	0134	21	4	306		=
LODNLV	23,2034	294	1	294			LOW7+2K	6337	961	1	960			LTHD+2	11,2203	205	1	205		
LODNNLOC	05,2075	251	8	251	267		LOW8	4564	303	17	1481077			LTHVACA	01,2563	99	4	97		
LODNNTAB	23,2000	294	1	251			LOW9	5341	998	8	1611058			LTIMEON	06,3235	373	2	373		
LODSAMPT	4605	304	3	228	276		LOWFCRIT	30,3401	847	1	845			LV	0044	13	4	7291023		=
LOGSUB	32,3060	925	1	918			LOWFOUR	24,3660	934	1	415			LVBUF	5347	998	1	984		
LOKONFLG	7757	177	3	186	220	=	LOWIDGOD	15,2000	329	1	331			LVELBIAS	10,3157	194	1	190		
LOKONSW	0012	15	-	-	-	=	LOWVERB	05,2030	250	1	251			LVSQUARE	0042	13	2	10221026		=
LONGBASE	33,1432	30	2	74	84		LPNGSMON	11,2562	215	1	215			LVWTLIST	5674	1064	11067			
LONGCADR	1151	28	2	10731074			LPOOH3	01,2625	100	1	100			LXA	01,2636	1038	1	963		
LONGCALL	5741	1073	6	63	756		LQPL	11,2403	211	1	210			LXC	01,2642	1038	1	963		
LONGCLCL	00,2771	75	2	74			LRALT	10,2637	187	1	199			L+PVT-CG	36,1450	50	2	613	614	
LONGCYCL	01,3640	1073	11074				LRCYCLE	11,2463	213	1	213			**********						
LONGER	11,3127	224	2	224			LRESC	26,3014	613	1	612			M11	36,1404	49	15	61	833	
LONGEXIT	33,1434	30	3	10731074			LRHEIGHT	10,3011	190	1	189			M21	36,1405	49	5	136	833	
LONGGYRO	13,2603	153	1	152			LRPOS2	10,3162	195	1	203			M22	36,1401	49	7	136	833	=
LONGJOB	33,2206	700	1	700			LRPOS2K	11,2126	203	1	200			M31	36,1406	49	5	136	833	
LONGRTRN	01,3660	1074	11074				LRPOSCAL	11,2500	213	2	212			M32	36,1403	49	6	136	833	=
LONGTIME	1153	28	11	741074			LRPOSCAN	10,3237	196	1	195			M36RADON	27,2613	722	-	-	-	
LOOKLOOP	24,2622	420	3	419	420		LRPOSCHK	10,2737	189	-	-	-		MAOFP2	22,3636	907	-	-	-	
LOOKLOOP	06,3465	379	1	379			LRPOSNXT	10,3204	195	2	195	196		MAOXP2	22,3607	906	1	905		
LOOKTOP	06,3461	379	2	368	379		LRRATIO	10,3136	194	2	193			MA2FP2	22,3674	908	-	-	-	
LOOP3	26,3076	615	2	615			LRTSTDEX	11,2421	212	1	212			MADP2	22,3607	905	1	886		=
LOOP	36,2774	931	4	930	931		LRUPT	0011	12	-	-	-	=	MAGSUB	4323	168	11	169	810	
LOOPCTR	0064	57	6	555	561	=	LRVELX	10,2643	187	1	199			MAGVTAN	36,3621	944	1	944		
LOOPSIN	34,2454	654	1	654			LRVELY	10,2643	187	1	199			MAINBRCH	17,3646	549	1	548		
LOOPTEST	21,2701	593	1	593			LRVELZ	10,2641	187	1	199			MAJ+	13,2527	152	1	151		
LOOSE	35,2316	456	1	456			LSENDCHA	15,2175	333	1	333			MAJ-	13,2642	154	1	151		
LOPDELOP	24,3271	428	1	428			LSENDDPA	15,2151	332	1	332			MAKECADR	5235	949	6	157	435	
LOPTY	15,3705	365	1	365			LSENDDSA	15,2225	333	1	333			MAKESERV	30,2102	819	1	820		
LOSO	27,3064	727	1	724			LSENDSNP	15,2115	332	1	331			MAKEXSMD	14,2325	387	1	380		
LOS1	35,1600	45	3	383	407	=	LSENOVF	22,3303	898	1	898			MANUCALL	34,3651	670	1	670		
LOS2	35,1606	45	3	384	407	=	LSEOVF	22,3307	898	1	898			MANUOFF	34,3570	669	1	669		
LOSCALAR	0004	59	3	410		=	LSETEVN	22,3271	898	2	876	877		MANUSTAL	34,3573	669	1	670		
LOSR	27,3066	727	1	724			LSETODD	22,3312	898	2	877			MANUSTAT	34,3602	669	1	668		
LOSVEC	35,1530	44	2	413	414		LSI1	33,1400	30	69	611099			MANUSTOP	34,3666	671	1	669		
LOW10	5337	998	17	2941077			LST2	33,1410	30	36	971071			MAP2	34,1504	36	3	37	886	=
LOW11	4563	303	10	106	965		LST2CADR	05,2132	252	1	252			MARKRUPT	13,3221	163	2	60	61	
LOW2	6311	998	11005			=	LST2CON	05,2131	252	1	252			MARKSTAT	0373	23	42	98	384	
LOW3	7765	998	11002			=	LST2FAN	11,2000	200	1	252			MASKCHK	37,2634	1086	-	-	-	

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J FAILED LEFTOVER WORD
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O OVERSIZE- OR ILL-DEFINED
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SYMBOL H	DEFINITION		REFERENCES F		SYMBOL H	DEFINITION		REFERENCES F		SYMBOL H	DEFINITION		REFERENCES F	
MASKREG	E5,1670	45	3 416	=	MFI	E3,1557	32	15 647 662	=	MIXTEMP	0115	19	3 247 254	=
MASS	1320	29	12 336 887	=	MFISYM	E3,1601	32	12 648 650	=	MKALARM	13,3107	160	1 160	
MASSCRIT	30,3402	847	- - -		MFS	E3,1557	32	6 32 647		MKCHEK	13,3076	160	- - -	
MASSGOOD	1750	474	1 490	=	MG2	13,2701	157	1 157		MKDEX	0073	167	3 166	=
MASSMON	30,3206	844	1 821		MGC	E5,1504	44	2 340 346		MKJOB	13,3373	166	1 166	
MASSMULT	30,3445	850	3 845 853		MGETUP	31,2325	812	1 325		MKOUT	13,3206	162	1 161	
MASSTEMP	E5,1561	42	4 822 847	=	MID5	4557	303	1 268		MKREJ	13,3421	166	1 163	
MATINC	0130	20	9 20 989		MID6	05,3492	288	2 288 290		MKRELEAS	13,3046	159	3 383 396	
MATRXJOB	27,2065	678	- - -		MIDAVE2C	25,3010	719	1 719		MKRUPTBB	4060	61	1 60	
MATXDET	14,2234	384	- - -		MIDAVEAD	27,2440	684	1 754		MKVAC	13,3015	159	1 159	
MAXANG	34,2411	653	1 648		MIDEXIT	E4,1602	35	- - -	=	MKVACFND	13,3031	159	5 159	
MAXDV	00,2616	1017	11013		MIDFLAG	0002	15	2 770 787	=	MKVB53	13,3070	160	1 160	
MAXDVSW	0130	20	610091023	=	MIDSIX	4443	277	2 277 287		MLOOP	31,2001	801	1 801	
MAXINDEP	0032	33	3 942 943	=	MIDIOAVE	07,2341	771	4 684 771		MMAINT	31,2000	801	3 66 807	
MAXPIJET	16,3163	507	2 507 508		MIN+	13,2524	152	1 151		MMCHANG	05,3267	282	1 253	
MAXRATE2	17,3506	546	1 550		MINANG	34,2407	653	1 647		MNIMPTST	17,2457	529	1 526	
MAXRATE	17,3505	546	2 549 551		MINCHECK	30,3556	943	1 942		MNKEYIN	0015	59	1 228	=
MAXTEST	00,2541	1013	410121025		MINIMASS	E5,1563	42	4 845 847	=	MOD2DPS	0004	876	1 879	=
MAXTHRST	33,2513	705	- - -		MINIMP	11,3101	222	- - -		MODABORT	13,2774	157	2 157	
MAXTIME	E6,1755	56	1 603		MINIMPDB	E6,1631	54	4 477 549	=	MODE2CHK	4362	169	1 169	
MAXTJET	17,3562	548	1 550		MININDEP	0026	33	3 942 943	=	MODE	0153	21	33 389 1027	
MAXTRIES	10,2351	179	1 179		MININIT	30,3252	845	1 845		MODEA	0422	24	4 178 358	=
MAYNOJET	17,3746	551	1 551		MIN-	13,2637	154	1 151		MODEB	0424	24	4 24 358	
MBYPASS	31,2117	803	1 803		MINMASSA	30,3414	848	1 845		MODECADR	0367	23	10 23 157	
MCHKST	31,2014	801	- - -		MINMASSD	30,3416	848	1 845		MODEEXIT	13,2043	139	10 138 159	
MCOMPTOR	17,2565	530	1 530		MINRA	E6,1442	50	- - -		MODEGOOD	13,2764	157	1 157	
MCOUNT	31,2010	801	1 801		MINRASQ	E6,1443	50	- - -		MODESLP	13,2770	157	1 157	
MD1	4567	303	1 290		MINTADR	17,2567	531	- - -		MODREG	0302	22	10 77 522	
MDAVADR	36,2541	751	1 739		MINTJCHK	16,3305	508	- - -		MODROUTB	04,3315	283	1 282	=
MDONE	5202	807	1 807		MINUS1	7771	997	2 152 741	=	MONBACK	05,3211	277	1 277	
MDUE	31,2055	803	1 801		MINUS2	5336	76	2 71 96	=	MONBOOST	27,2311	681	1 681	
MDUERET	31,2012	801	1 803		MINUSU	17,3233	541	1 540		MONBUSY	05,3212	277	1 276	
MDUETEMP	1200	28	4 803 804		MINUSV	17,3334	542	- - -		MONDEL	05,3157	276	1 276	
MEASMODE	E4,1600	35	7 301 773	=	MIS	E3,1535	32	23 645 755		MONDO	05,3160	276	1 276	
MEASQ	E4,1574	35	2 295 300	=	MISALIGN	14,3146	400	1 390		MONIT1	05,3101	275	- - -	
MENTABS	5155	806	1 806		MISCJUMP	6403	963	1 960		MONITOR	05,3077	275	7 252	
MENTRYT	5144	806	3 806		MISSROOT	16,3322	509	1 508		MONMASK	05,3210	277	1 276	
MESSAGE	11,2711	219	1 218		MIXAD	05,2235	254	1 254		MONREPOS	12,3145	134	1 134	
METERADD	14,3373	403	1 406		MIXBR	0130	20	13 251 294	=	MONREQ	05,3134	276	2 275 276	
METEROUT	12,2212	109	1 110		MIXCON	23,2036	294	1 294		MONSAVE1	0312	22	7 98 289	
METHOD1	34,2337	649	1 649		MIXNN1	05,2211	254	1 254		MONSAVE	0311	22	7 98 277	
METHOD2	34,2313	649	- - -		MIXNN2	05,2223	254	1 254		MONSTART	14,2065	381	1 381	
METHOD3	34,2363	650	2 649		MIXNOUN	05,2176	254	1 251		MOONFLAG	0003	15	2 770 786	=

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MOONPOS	07,3735	798	1	787			MP6TO7	E3,1772	33	6	709	711		MS30P	16,3567	515	2	496	516
MOONSW	0101	15	6	15	944	=	MP8JOB	27,2564	721	1	813			MS30QR	17,2561	530	-	-	-
MOONVEC	07,3743	798	1	798		=	MP8TASK	27,2601	721	1	721			MS50QR	17,2562	530	-	-	-
MOREDES	10,2461	182	2	182			MP8T09	E3,1773	33	1	723			MSGBUSY	11,2754	219	1	219	
MOREIDLE	16,2166	490	6	487	490		MP9CALL	27,2642	722	1	722			MSGCNT	E7,1562	47	8	217	218
MORET5ID	16,2544	496	5	496	516		MP9-IIDT	E4,1752	41	1	736		=	MSGSCAN	11,2642	217	3	217	218
MOREURG	17,3047	537	1	537			MP9JOB	33,2764	728	1	813			MSGVN	11,2757	219	1	219	
MORNUM	04,2201	243	2	242			MP9TERM1	33,3351	736	1	738			MSTART	5162	807	1	100	
MOSTPASS	21,2014	574	2	574	580		MP9TM1AD	33,3471	738	1	733			MSTATECK	31,2017	801	1	801	
MOVENDX	36,2324	745	1	65			MP++	37,2436	1084	-	-	-		MSTATEOK	31,2034	801	2	801	
MOVEPERM	07,2311	770	2	769	771		MP+-	37,2461	1084	-	-	-		MSTORE1	01,2651	1038	2	1039	1042
MOVETEMP	07,2276	770	2	767	774		MPAC	0144	21	749	2010	97		MSUCHK	37,2612	1086	-	-	-
MOVEWGTS	21,2102	575	1	575			MPAC+	00,2435	1011		2101	0		MTABLE1	31,2360	813	1	813	
MP03JOB	25,2000	687	1	684			MPAC-	00,2431	1010		2101	0		MTABLE	31,2333	813	4	803	805 =
MP07DELT	25,3006	719	1	713			MPACSHR	00,2033	999		2100	71026		MTEMPUP	07,2301	770	1	770	
MP07JOB	25,2474	713	1	813			MPACSRND	00,2030	1000	1	999			MTIMEDWN	31,2107	803	1	805	
MP11HOLD	36,2416	748	1	64			MPACVBUF	7642	993	2	989	1022		MTIMEFIX	31,2121	803	2	803	
MP11JOB	36,2000	739	1	813			MPCHK	37,2447	1084	-	-	-		MTIMER1	1167	28	2	89	102
MP11OUT	36,2463	749	2	64	749		MPDI0B	E4,1731	41	1	718		=	MTIMER2	1166	28	4	89	802
MP11TASK	36,2545	752	2	66	739		MPENTRY	5126	806	5	711	749		MTIMER3	1165	28	2	89	102
MP11TERM	36,2452	749	1	751			MPERMLUP	07,2314	770	1	770			MTIMER4	1164	28	20	66	812
MP11TMAD	36,2537	751	1	741			MPHASE1	1173	28	2	89	102		MTIMER4T	1174	28	4	801	804
MP11IO13	E4,1753	41	1	750		=	MPHASE2	1172	28	3	89	335		MTIMERUP	31,2265	811	2	808	
MP13*544	27,3263	756	1	756			MPHASE3	1171	28	2	89	102		MU	36,3663	945	1	944	
MP13JOB	27,3114	754	1	813			MPHASE4	1170	28	8	89	808		MUCHTIME	01,3663	1074	2	1073	1074
MP13OUT	27,3277	757	1	757			MPHASEUP	31,2221	810	2	808			MUEARTH	30,3202	843	2	883	904
MP13TERM	27,3270	757	1	757			MP-+	37,2467	1084	-	-	-		MULTEXIT	5014	315	1	315	
MP13TMAD	27,3326	757	1	755			MP--	37,2475	1084	-	-	-		MULTFAIL	5020	315	1	315	
MP16JOB	27,3522	764	-	-	-		MPLEGAL	31,2237	810	1	810			MULTFLAG	E6,1520	52	-	-	-
MP2JOB	27,2056	676	2	67	675		MPRETRN	E4,1662	40	9	739	762	=	MULTIJET	16,3177	507	1	506	
MP2TASK	27,2003	674	1	389			MPTEMP	0125	20	63	2010	36		MUMOON	30,3204	843	-	-	-
MP3-4ADR	27,2434	684	1	684			MR12	E6,1400	49	2	136	598		MXM3	35,3417	651	3	645	668
MP3MMODE	17,2265	524	1	522			MR13	E6,1402	49	2	136	598		MAV	7413	988	1	962	
MP4HOLD	33,2146	699	1	699			MR22	E6,1401	49	2	49	598		MYNDX	E3,1654	32	-	-	-
MP4IGN	33,2470	704	-	-	-		MR23	E6,1403	49	2	49	599							
MP4IGN+3	33,2506	704	2	704			MRATEADD	14,3374	403	1	406			NARROWDB	6110	831	1	475	
MP4JOB	33,2000	696	1	684			MRETURN	1207	28	7	806	811		NAVKEYIN	0016	59	5	163	=
MP4SEP	33,2117	698	-	-	-		MR.CLEAN	01,2151	91	3	90	100		NBD2	12,3517	866	1	868	
MP4TERM1	33,2540	705	1	707			MS100	16,2266	491	1	490			NBD3	12,3526	866	1	866	
MP4TM1AD	33,2647	707	1	702			MS20F	21,2401	581	2	574	585		NBDONLY	12,3501	866	1	1065	
MP6A	27,2526	710	2	710			MS20QR	17,2560	530	1	519			NBDX	E3,1444	30	7	30	1065
MP6B	27,2532	710	-	-	-		MS30120	20,3030	585	2	585	589		NBDY	E3,1445	30	2	862	866
MP6JOB	27,2504	709	2	823			MS30F	21,2402	581	3	574	591		NBDZ	E3,1446	30	2	862	866

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NBPOS	E5,1536	44	5 418 471		NEGUEROR	17,2274	524	- - -		NJ+U	E6,1672	55	5 543 631	=
NBPOSPL	24,3353	429	3 411 419		NEGSFE	24,2731	421	1 421		NJ+V	E6,1674	55	5 541 631	=
NBRANCH	07,3422	790	2 788 796		NEGSGN	04,2262	244	1 240		NJET	E6,1461	50	6 498 507	
NBSM2	15,2560	344	- - -		NEGSIZ	24,2472	418	1 418		NJ-Q	E6,1667	55	3 541 624	=
NBSM	15,2555	344	9 356 840		NEGUU	E6,1523	52	10 52 603		NJ-R	E6,1671	55	1 540	=
NBSMBIT	0004	15	3 343 345	=	NEGUR	E6,1525	52	7 495 599	=	NJ-U	E6,1673	55	5 541 631	=
NCDU	E3,1601	32	3 668	=	NEGVEX	E5,1555	42	6 845 923	=	NJ-V	E6,1675	55	5 542 631	=
ND1	4566	303	4 244 283		NEGXDV	E5,1537	48	2 69 819	=	NJPLACE	0145	57	6 621 624	=
NDCMPTST	05,2417	260	1 260		NETACGET	20,2576	562	2 561 562		NNADTAB	23,2052	295	1 294	
NDP1	0033	334	1 334	=	NETACNDX	0061	57	10 544 562	=	NNADTEM	0136	21	8 251 294	
NDP2	0033	334	1 334	=	NETZERO	6165	956	- - -		NNTYPTAB	23,2152	296	1 294	
NDX2DPS	E4,1400	36	8 36 884	=	NEWDATA	12,2207	109	1 109		NNTYPTEM	0137	21	5 260 294	
NDX+SU	37,2643	1087	- - -		NEWDELH1	34,3476	668	2 667 670		NOATTOFF	13,2324	146	3 116 145	
NDXBR	E4,1401	36	5 36 887	=	NEWDELTA	36,3530	942	1 943		NOBACKUP	16,3074	506	1 504	
NDXCIR	E5,1537	44	26 381 425		NEWDLTAV	E4,1414	34	- - -	=	NOBITS	E5,1576	45	8 403 406	=
NEARERTH	36,3465	940	1 940		NEWJOB	0067	14	26 971097		NOCHOKLD	35,2757	465	2 68 461	
NEAR1	36,3651	945	2 937 941		NEWLOC	0065	14	910491056	=	NODAPNO	16,2502	496	1 496	
NEARONE	15,3237	354	1 352		NEWMODE	6124	954	11 3611027		NODAPOFF	36,2253	743	1 743	
NEARZERO	36,3641	945	1 931		NEWMODEA	4122	77	1 879		NODESNB	10,2413	181	1 181	
NEG0	7770	997	7 1071077		NEWMODEX	4117	77	29 210 764		NODESSM	10,2362	180	1 180	
NEG12	00,3710	1036	3100611026		NEWNUV	E4,1422	34	- - -	=	NODSPLAY	37,3734	1100	11099	
NEG180	04,2776	272	1 272		NEWOPS	6134	954	4 953 966		NODSPOUT	12,2070	107	1 107	
NEG1	7771	997	7 262 997	=	NEWPHASE	4246	87	8 326 812		NODV	30,2260	823	- - -	
NEG172	7744	997	10 961071		NEWPRIO	0063	14	11 6831057	=	NOEBANK	37,3176	1092	11093	
NEG2	5336	997	5 761077		NEXLMP1	36,2502	752	1 66		NOEND	10,3001	190	1 190	
NEG3	5340	998	4 1531077		NEXLMP2	36,2570	752	1 66		NOERR	24,2315	415	2 415	
NEG4	6156	955	2 9591077		NEXLMP3	36,2577	752	1 66		NOGIMLOC	34,3437	666	4 661 662	
NEG5	05,2077	251	1 251		NEXLMP	36,2553	752	1 66		NOGIMRUN	12,2561	120	2 120	
NEG	7017	976	4 976		NEXT	24,3306	428	1 428		NOGO	34,3001	660	1 660	
NEGALPH	21,3336	602	1 602		NEXTCDU	13,2144	142	4 142 144		NOIBNKSW	6127	954	1 994	
NEGANEGB	17,3353	542	1 542		NEXTCOL	07,3277	794	2 793 794		NOINT	07,2274	769	2 769	
NEGAPOSB	17,3352	541	1 540		NEXTCORE	01,3134	1052	21051		NO.CORES	01,3114	1051	210511056	
NEGBIT9	16,3760	518	1 517		NEXTCYLT	E4,1474	43	1 372	=	NO.PJETS	E6,1657	55	2 493 502	
NEGBURG	17,3326	542	1 540		NEXTIME	E3,1604	32	3 670	=	NO.QJETS	E6,1607	53	5 53 587	
NEGCSP1	16,3566	515	1 493		NEXTSET	06,3017	369	2 369		NO.RJETS	E6,1610	53	4 549 587	=
NEGCSP2	17,2575	531	- - -		NEXTTIHRT	06,3367	377	2 377 378		NO.WDS	6310	959	5 9591027	
NEGD	21,3571	631	6 629 631		NEXTTIME	E4,1420	43	1 369	=	NOKILL	37,3563	1097	210971098	
NEGDP	16,3072	505	3 504		NEXTTRIM	06,3247	374	2 374		NOMASS	30,3373	847	1 844	
NEGHDAP	17,3617	549	1 548		NGUBGH	24,3435	680	1 680		NOMDNLST	15,2236	335	2 99 335	=
NEG.2	04,3010	272	1 272		NIL	34,2415	653	3 648 662		NOMINIMP	11,3107	223	- - -	
NEGMAX	7745	997	16 3661066	=	NINE	4550	997	2 409 465	=	NOMORE	10,2724	189	2 189 194	
NEGONE	7771	997	12 961077		NJ+Q	E6,1666	55	11 55 623		NOMSG	11,2700	218	2 217	
NEGOPT	04,2615	262	1 262		NJ+R	E6,1670	55	1 543	=	NOMTMLST	01,2555	99	1 98	

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SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F
NOQBRSM	5737 1072	1 61	NTIMES	E4,1410	43 4 369 =	OBLATE	07,3325	789 - - -
NOQJETS	17,2270 524	2 524 525	NTLZPASS	22,2102	879 3 880 898	OBLATEST	07,3322	788 1 787
NOQRUN	17,2326 530	2 529 530	NTLZPSST	22,2152	879 1 879	OCT40010	12,3040	131 2 130
NOQRSM	5735 1072	7 61 609	NUCHANGE	5622	1060 11060	OCT10001	12,3106	132 2 132
NORESET	13,2470 150	- - -	NUDIRECT	5616	1060 11060	OCT11	4530	409 1 404 =
NORM	34,3271 664	1 665	NUFAZ+10	4260	87 11061	OCT12	4570	409 1 404 =
NORMALQ	17,2106 521	2 491 521	NULLFILT	17,2000	519 1 519	OCT14000	5640	83 2 82 83 =
NORMCTRL	21,3143 635	1 635	NUM	04,2070	241 9 240 241	OCT1400	5352	998 9 711061
NORMGAM	E4,1605 35	- - - =	NUMBALTS	20,2346	555 2 557	OCT140	13,3466	167 1 163
NORMLIZE	30,2412 827	3 61 827	NUMGRPS	7766	99 2 93 94 =	OCT15000	5641	131 1 129 =
NORMLOP	35,2156 454	1 454	NUMSTEP	06,3270	374 - - -	OCT15	12,3037	131 1 129
NORMLPOL	20,2626 563	1 555	NUMTIMES	E4,1511	43 3 374 =	OCT1700	12,3046	131 1 125
NORMQADR	17,2105 521	1 521	NUV	1232	29 7 324 774 =	OCT1720	12,3045	131 1 127
NORMRETN	17,2456 529	3 548 551	NVBNKTEM	0332	22 1 287	OCT176	00,2126	1002 21008
NORMTA	12,2006 104	1 104	NVCODE	E4,1601	35 - - - =	OCT17770	4241	83 2 81 83
NORMTEST	00,3473 1031	- - -	NVCOM	04,2246	243 1 244	OCT177	5342	76 1 73 =
NORMURG	17,3042 537	2 537	NVQTEM	0331	22 3 287 288	OCT20002	12,3160	134 1 134
NOROOT	17,3734 551	1 550	NVSBBBNK	4457	287 1 287	OCT23	4565	961 1 959 =
NORRGMON	12,3161 135	7 108 134 =	NVSBENDL	04,3365	282 2 282 284	OCT27	14,3665	408 1 408
NOSAVE1	07,3115 784	1 784	NVSBWAIT	4657	307 53 160 448	OCT30	23,3344	449 1 445
NOSAVE2	07,3270 787	1 787	NVSBWTI	4664	307 1 307	OCT32002	12,3157	134 1 134
NOSOL	36,3056 932	1 931	NVSUBI	05,3344	288 2 259 287	OCT34	13,3465	167 1 163
NOTBIT12	04,2445 247	2 246	NVSUB	4444	287 5 1661097	OCT37737	12,2613	121 1 121
NOTRANS	17,2517 530	1 530	NVSUBB	05,2000	250 1 287	OCT37776	06,2440	71 1 72
NOTRHC	11,2673 217	- - -	NVSUBCOM	4453	287 1 288	OCT3	6311	167 2 160 161 =
NOTUMBL	33,2077 698	1 698	NVSUBEND	4464	288 4 282 289	OCT40001	6153	955 3 7411066
NOULLAGE	20,2066 475	11 102 756	NVSUBMON	4460	288 3 209 277	OCT40010	13,2251	144 3 144 146
NOUN	04,2256 244	1 240	NVSUBSYI	04,3514	307 1 240	OCT40201	01,3563	1069 11066
NOUNADD	0135 21	24 254 302 =	NVSUBSYB	04,2001	240 1 307	OCT40400	6006	315 1 315
NOUNCADR	0310 22	8 251 302	NVSUBUSY	4654	307 4 2191098	OCT50K	11,2631	216 1 216
NOUNREG	0273 22	13 98 294	NVTEMP	0113	19 8 166 307 =	OCT54	12,3042	131 1 116
NOUNTEM	0112 19	3 254 =	NXTBNK	37,3446	1096 21097	OCT55000	05,3523	312 1 311
NOUT	0307 22	10 981100	NXTFL33	12,2535	119 7 127 128	OCT60000	06,2705	84 1 83
NOUTCON	7764 997	1 98 =	NXTIBI	12,2523	119 3 119	OCT67	11,3312	320 1 319
NOVAC2	01,3105 1051	11049	NXTIFAIL	12,2340	113 12 122 126	OCT70000	21,2571	590 1 590
NOVAC3	01,3110 1051	11052	NXTIFBIT	12,2326	113 3 113	OCT70	11,3313	320 1 319
NOVAC	5505 1049	35 7 1097	NXTNJZER	20,3700	624 1 622	OCT70K	11,2633	216 1 216
NREAD	24,3057 424	- - -	NXTNMBR	37,3674	1099 2109811099	OCT71000	12,3047	131 1 125
NSAMP	0424 24	3 188 190 =	NXTONOFF	06,3152	372 2 372	OCT71	11,3314	320 1 319
NSBUGD	24,3454 430	5 431 432	NXTRRIAX	10,2161	175 1 175	OCT72	11,3316	320 1 319
NSCALR-1	22,3741 909	1 889	NXTRST	01,2320	94 1 94	OCT73	11,3311	320 1 319
NSFLAGD	24,3452 430	- - -	NXTSUPR	37,3473	1096 11096	OCT75	12,3043	131 2 130
NSNAP	0014 332	4 331 332 =	NZACCDOT	0062	603 3 602 603 =			

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SYMBOL H	DEFINITION	REFERENCES F
OCT76	11,3317 320	1 319
OCT7	7765 83	3 71 83 =
OCTAL3	6311 959	1 997
OCTBACK	05,3250 280	1 282
OCTID	26,2353 325	1 322
ODD	36,3366 939	- - -
OFFGIMQ	21,3233 599	- - -
OFFGIMR	21,3236 599	1 522
OFFTIME	E4,1502 43	1 372 =
OFFTIMER	E4,1505 43	1 373 =
OFFTMBUF	E4,1406 43	4 372 373 =
OFLOOP	37,3111 1090	21091
OGC	E5,1500 44	13 200 470
OGCADR	14,3712 409	- - -
OGCECADR	23,3360 449	- - -
OGCPL	24,3651 434	1 426
OGCZERO	14,2752 396	3 380 465
OGF	E3,1615 32	6 662 =
O-OFLOW	37,3106 1090	- - -
OK2WRITE	16,2732 502	1 502
OKAYGTS	17,2114 521	1 521
OKC2	34,3342 665	2 665
OKDESNB	10,2372 181	1 181
OKDESSM	10,2331 178	1 180
OKG21	34,3066 662	1 661
OKPHI	34,2151 659	1 659
OKT30	11,2706 218	2 217 224
OKTHETA	34,2731 659	1 658
OKU12	34,2353 650	1 650
OKU21	34,2327 649	1 649
OKU31	34,2371 650	1 650
OLDATAGD	0426 24	4 188 194 =
OLDBIT	0765 24	1 826 =
OLDDATA	12,2161 109	1 109
OLDDVSEL	1346 29	3 101 338
OLDGT	E5,1743 46	4 453 685 =
OLDPRIO	4201 82	1 85
OLDRCO	32,2321 916	1 916
OLDWFORD	E6,1626 54	3 54 608
OLDWFORR	E6,1627 54	2 517 608 =
OLDXFORP	E6,1425 49	6 49 493
OLDYFORP	E6,1426 49	2 493 =
OLDYFORQ	E6,1427 49	4 489 594 =
OLDZFORQ	E6,1430 49	2 519 =
OMEGA	E6,1422 47	11 681 838 =
OMEGA.K	0061 52	6 597 =
OMEGAP	E6,1415 49	14 49 839
OMEGAPD	0774 24	11 24 672
OMEGAQ	E6,1416 49	18 47 839 =
OMEGAQD	0775 24	6 476 671 =
OMEGAR	E6,1420 49	17 47 839 =
OMEGARD	0776 24	8 475 671 =
OMEG/MS	14,3764 409	2 389 410
ONE	7763 997	184 721070 =
ONEORTWO	4175 82	1 83
ONEREV	27,3104 727	2 725
ONESEK	34,3636 670	4 669 670
ONETOTWO	21,2307 579	3 578 591
ONEYR	27,3110 727	3 724
ONLYTST1	17,3714 550	2 550
ONLYTST2	17,3762 551	2 551
ONTIME	E4,1477 43	1 373 =
OPCHK1	24,2344 416	- - -
OPCHK2	24,2345 416	1 416
OPCHK	24,2252 415	2 210 415
OPCHKPOS	24,3533 432	1 429
OPDEGIN2	04,3031 272	- - -
OPDEGOUT	04,2601 262	1 262
OPESYS	33,2037 697	1 697
OPJUMP2	6313 960	1 954
OPJUMP3	6327 961	1 960
OPJUMP	6143 954	1 954
OPONLY	12,2455 116	1 115
OPPSGNC2	34,3340 665	1 665
OPRTRDLY	23,3175 446	6 437 446
OP/INERT	11,2076 201	2 201
OPTCADR	0370 23	2 98 384 =
OPTCOARV	11,2153 207	1 207 =
OPTDATA	14,2524 390	3 380 395
OPTDEGIN	04,3024 272	1 271
OPTNREG	E5,1617 45	2 410 418 =
OPTRDRIN	14,2547 391	1 399
OPTSTALL	13,2747 357	2 383 384 =
OPTX	0036 12	1 172 =
OPTXCMD	0054 13	1 110 =
OPTY	0035 12	9 134 365 =
OPTYCMD	0053 13	2 110 176 =
OPTYHOLD	0416 24	2 189 198
ORBINTAD	33,2653 707	2 700 733
ORBINTJB	33,3157 732	2 67 736
ORDINARY	21,3674 634	1 633
OURRCBIT	7763 474	- - -
OUT0	0010 59	3 104 107 =
OUTCYCLE	34,3356 665	1 665
OUTLINK	0057 13	- - -
OUTNEG	24,2652 420	1 420
OUTPLUS	24,2641 420	1 420
OUTSIDE	36,3617 944	1 944
OVCON	37,2012 1077	11088
OVERFLOW	7101 978	14 9771003
OVERMANU	34,3640 670	2 669
OVERRIDE	20,3630 623	1 621
OVF2DPS1	22,3061 893	1 885
OVF2DPS2	22,3057 893	1 885
OVF2DPS3	22,3066 893	1 886
OVF2DPS4	22,3073 893	2 892
OVF+	00,2412 1009	21009
OVFIND	0111 19	26 2641053
P16CLS	27,3601 765	1 765
P16MXDB	27,3565 765	1 765
P16WAKE	27,3550 765	2 765
P21	E3,1601 32	2 661 662 =
P37BLAT	E3,1760 33	2 678
P37BLONG	E3,1762 33	1 678
PAC	E5,1476 44	- - -
PACTIVE	01,2326 94	1 94
PALFLT	35,2203 455	1 454
PARL	0002 676	1 879 =
PASS	0104 15	4 912 918 =
PASSCTR	E6,1736 56	5 594 634
PASTEVB	4435 277	1 277
PAXADIDL	16,2222 491	2 490
PAXBNK20	20,3031 585	2 585 589
PAXFILT	16,2400 494	- - -
PAXIS1	E4,1400 38	6 700 915 =
PAXIS	16,2255 492	4 491 585
PAXISADR	21,2405 581	- - -
PAXISCNT	16,2406 494	1 492

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SYMBOL H	DEFINITION	REFERENCES F
PAX/PILT	21,2077	575 6 574 634
PBIASX	E3,1436	30 1 30
PBIASY	E3,1440	30 - - -
PBIASZ	E3,1442	30 - - -
PBODY	E4,1627	40 8 40 788
PCDUX	E6,1411	47 1 834 =
PCDUY	E6,1412	47 1 834 =
PCDUZ	E6,1413	47 1 834 =
PCLOOP	01,2301	93 1 94
PCNTF	1323	29 7 695 852 =
PCNTFAD	36,2535	751 3 743 746
PCNTFMAD	33,2655	707 2 705 734
PCNTFMAX	30,3466	851 3 695 751
PCNTJOB	30,3507	852 2 67 851
PCNTOVER	30,3456	850 2 63 852
PCOM	E6,1431	50 1 296
PCONS	E4,1512	38 2 919 =
PDA	0026	44 - - - =
PDDL	6601	971 1 962
PDUM	0006	37 8 894 903 =
PDVL	6635	972 1 962
PERCENT	36,3655	945 4 930 932
PERFORM	06,3334	375 1 375
PERROR	E6,1466	50 4 488 522
PFAILOK2	13,2303	145 1 146
PFAILOK	13,2310	145 1 116
PFCLITE	22,3552	905 1 895
PFCTKIM	22,3556	905 1 895
PFCULLG	22,3544	905 1 894
PFILTADR	E6,1572	53 5 490 632
PFRPTLST	E6,1574	53 10 574 634
PGNCSMON	30,2237	822 6 102 831
PGNSCADR	6106	831 3 479 762
PGUID	30,3465	850 1 856
PHAS16A	27,3552	765 1 765
PHAS16B	27,3557	765 1 765
PHASCHNG	4161	81 144 81 922
PHASE1	1100	27 3 83 94
PHASE2	1102	27 1 799
PHASE3	1104	27 - - -
PHASE4	1106	27 - - -
PHASE5	1110	27 1 836
PHASE6	1112	27 - - -
PHASENUM	0764	24 10 90 805
PHIV	E4,1466	34 5 793 =
PHSZCADR	06,2000	63 1 71
PHSBB1	E3,1517	31 - - -
PHSBB2	E3,1521	31 - - -
PHSBB3	E3,1523	31 - - -
PHSBB4	E3,1525	31 - - -
PHSBB5	E3,1527	31 - - -
PHSBB6	E3,1531	31 - - -
PHSCHNG2	06,2634	83 1 84
PHSNAME1	E3,1516	31 4 71 85
PHSNAME2	E3,1520	31 - - -
PHSNAME3	E3,1522	31 - - -
PHSNAME4	E3,1524	31 - - -
PHSNAME5	E3,1526	31 - - -
PHSNAME6	E3,1530	31 - - -
PHSPARI2	06,2627	75 1 83
PHSPRDT1	1114	27 5 72 85
PHSPRDT2	1116	27 - - -
PHSPRDT3	1120	27 - - -
PHSPRDT4	1122	27 - - -
PHSPRDT5	1124	27 - - -
PHSPRDT6	1126	27 - - -
PICKAXIS	34,2042	645 1 645
PICKX	34,2064	646 1 646
PIESW	0100	15 3 929 930 =
PIF	E5,1572	42 7 855 857 =
PIFPSET	E5,1574	42 5 853 855 =
PIGNALG	22,3726	909 1 889
PINACT	01,2333	94 1 94
PINGSMON	07,2076	102 1 101
PIPI	14,2106	381 2 381 382
PIPZ	14,2111	381 1 382
PIPZADR	14,2134	382 3 381 382
PIPZCADR	30,2114	820 - - -
PIPABIAS	E3,1436	30 1 861 =
PIPACHK	24,2113	412 1 412
PIPAGE	1101	28 4 817 830 =
PIPANU	E5,1540	44 6 423
PIPASC	35,3320	470 1 455
PIPASCF	E3,1437	30 1 861 =
PIPASCFX	E3,1437	30 1 30
PIPASCFY	E3,1441	30 - - -
PIPASCFZ	E3,1443	30 - - -
PIPASR	30,2576	835 3 817 820
PIPAX	0037	12 20 147 837 =
PIPAY	0040	12 7 147 453 =
PIPAZ	0041	12 11 147 837 =
PIPCHECK	30,2134	821 1 821
PIPCTR	E5,1512	48 2 821 =
PIPEBANK	07,2152	767 - - -
PIPFAIL	12,2720	127 1 131
PIPFREE2	13,2343	147 1 147
PIPFREE	13,2346	147 - - -
PIPINDEX	E5,1541	45 17 381 431
PIPLOOP	30,2150	821 3 821
PIPNDX	E5,1542	45 8 381 394
PIPREAD	30,2064	819 3 819 836
PIPRETRN	1304	29 2 29 40 =
PIPSDONE	30,2065	819 1 837
PIPTIME	1306	29 17 685 899 =
PIPTIMET	E4,1444	36 3 36 889 =
PIPUSE	13,2331	147 - - -
PI/4	22,3737	909 4 882 936
PIT	14,3456	404 1 405
PITCHBTS	16,3751	518 1 517
P-RHCCTR	0043	50 - - - =
PJETSLEC	16,2642	500 3 498 509
PJUMPADR	E6,1652	54 5 54 510
PLENTY	10,2731	189 1 189
PLUSD	21,3464	630 1 629
PLUSDP	16,3061	504 1 504
PLUSDR	21,3535	631 1 630
PLUSU	17,3356	543 - - -
PLUSV	17,3271	541 1 541
PLUSXDVA	30,2234	822 1 823
PLUSXDVD	30,2236	822 - - -
PMBR	16,3232	507 1 507
PMEMORY	1210	28 20 28 29
POINT=90	21,2400	581 1 580
POINTER	0146	76 7 73 75 =
POINTVSM	E3,1655	32 5 645 912
POLADR	17,3435	544 1 544
POLFOUND	20,2427	557 1 556
POLISH	0107	19 39 191045
POLLEY	5373	1046 21046

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SYMBOL H	DEFINITION	REFERENCES F
POLRELOC	0063 57	6 555 561 =
POLTABLE	20,2704 566	1 556
POLTEST	E6,1516 51	- - -
POLTYPE	17,3431 544	15 540 543
POLTYPEP	20,2721 555	1 544
POLY2	7317 985	1 985
POLY	7274 984	6 782 1035
POLYCNT	0130 20	4 984 985 =
POLYCOM	7304 984	1 984
POLYLOOP	7314 985	1 985
POLYRET	0131 20	3 984 985 =
POOH2	01,2607 100	2 94 100
POOH3	01,2140 90	1 100
POOH	4272 100	2 723 826
POPNJ1	20,3731 625	1 625
POPNJ2	20,3742 625	1 625
POPNJ3	20,3751 625	1 625
POPNJ4	20,3721 625	2 625
POPNJ5	20,3750 626	1 625
POPNONJ	20,3525 620	3 625 626
POS1	14,2633 393	1 393
POS1/16	07,3705 797	1 781
POS1/2	7746 997	21066 =
POS1/4	07,3701 797	1 781 =
POS2	14,2640 393	1 393
POS3	14,2656 393	1 393
POS4	14,2677 394	1 393
POS5	14,2731 395	1 393
POSANEGB	17,3331 542	- - -
POSAPOSB	17,3207 540	- - -
POSARG	5425 1047	11047
POSBURG	17,3204 540	- - -
POSDRIVE	21,3176 598	3 598 634
POSGMBL	24,3104 425	3 411 419
POSGN	04,2275 244	1 240
POSITON	E5,1544 45	16 380 471
POSLOAD	14,2015 380	- - -
POSMAX	7743 997	61 881071
POSN10	24,3562 432	1 429
POSN11	24,3573 432	1 429
POSN1	24,3431 430	1 429
POSN2	24,3440 430	1 429
POSN3	24,3445 430	1 429
POSN4	24,3457 430	1 429
POSN5	24,3467 430	1 429
POSN6	24,3477 431	1 429
POSN7	24,3507 431	1 429
POSN8	24,3522 431	1 429
POSN9	24,3551 432	1 429
POSNJUMP	14,2621 393	2 380 397
POSNV	E5,1654 46	2 456 =
POSQERQR	17,2325 524	- - -
POSSPE	24,2733 421	1 421
POSTAND	11,3167 226	1 200
POSTJUMP	5225 948	45 93 824
POSTKALC	33,3036 730	3 63 730
POSTLET	27,2270 681	3 66 680
POSTPTIL	21,2410 581	3 580 591
POSTQRFL	21,2755 594	1 593
POSTRUE	07,3101 784	1 791
POWRSERS	7267 984	2 902
PPHM1	22,3536 905	1 895
PPHMICS	22,3540 905	1 899
PPOLTABL	16,2754 502	4 501 502
PRAPS	32,2067 912	1 911
PRATE	E4,1530 38	4 918 919 =
PRATECOM	E6,1435 50	- - -
PRATEDIF	E6,1462 50	1 498
PRDTTAB	06,2000 63	3 74 75 =
PREAP2AD	27,3324 757	1 754
PREAPS2	32,2000 911	1 757
PREBJUMP	4130 77	- - -
PREBURN	22,2000 875	1 751 =
PRECOI	33,2222 700	- - -
PREDOT	7226 983	2 988 991
PREFORCE	E5,1545 42	8 845 846 =
PREGBSY	4637 306	3 306 1094
PREIGN	32,2116 912	1 911
PREKALC4	33,2333 702	1 707
PRELMIRX	E5,1720 46	2 46 467 =
PRELTERM	35,3376 472	2 471 472
PREMTRXC	E5,1717 46	- - - =
PRENVBSY	4651 307	1 307
PREREAD	30,2000 817	9 68 755
PREROOT	17,3763 551	1 551
PRERRORS	37,2022 1077	31078
PRESINE	00,3507 1032	21032
PRESTAND	11,3121 224	1 200
PRESTORE	6470 967	1 967
PRETINIT	22,3531 904	5 875 892
PREVDEP	E3,1730 33	2 931 942
PRI010	7747 1061	1 722 =
PRI011	5636 1061	- - -
PRI012	5234 1061	- - - =
PRI013	5637 1061	- - -
PRI014	5640 1061	2 71 83
PRI015	5641 1061	4 131 870
PRI016	5642 1061	8 131 755
PRI017	5643 1061	4 160 914
PRI01	7752 1061	2 496 497 =
PRI020	7746 1061	9 207 870 =
PRI021	5644 1061	3 381 911
PRI022	5645 1061	1 175
PRI023	5646 1061	- - -
PRI024	4260 1061	- - - =
PRI025	5647 1061	3 198 851
PRI026	5650 1061	1 182
PRI027	5651 1061	6 219 732
PRI02	7751 1061	11097 =
PRI030	5210 1061	11 77 998 =
PRI031	5652 1061	2 675 868
PRI032	5653 1061	3 159 817
PRI033	5654 1061	- - -
PRI034	5655 1061	5 96 961
PRI035	5656 1061	4 3751065
PRI036	5657 1061	- - -
PRI037	5660 1061	10 93 814
PRI03	5632 1061	4 1671061
PRI04	7750 1061	- - - =
PRI05	5633 1061	1 801
PRI06	5634 1061	2 1761077
PRI07	5635 1061	- - -
PRIOCH2	01,3324 1057	11050
PRIOCHNG	5557 1050	- - -
PRIOKM	7746 721	2 727 764 =
PRIORITY	0157 21	26 971058
PROCTNON	12,2355 115	1 115
PROG44	36,2300 745	1 744
PROG	36,2656 929	1 929

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SYMBOL H	DEFINITION		REFERENCES F		SYMBOL H	DEFINITION		REFERENCES F		SYMBOL H	DEFINITION		REFERENCES F	
PROGLARM	5005	315	1 314		QDIFF	E6,1467	52	8 534 595	=	R*Q*CHKR	17,2342	525	1 525	
PROTCT+X	16,2513	496	1 496		QERRCALC	17,2620	533	1 533		R*Q-CHKR	17,2311	524	1 524	
PROTCTOR	16,2455	495	1 488		QERROR	E6,1467	50	4 52 533		R*,CHKDB	17,2354	525	- - -	
PRT2CADR	06,2001	63	1 73		QGIMBITS	16,2453	495	1 495		RACCDOT	E6,1535	52	5 495 599	=
PSIV	E4,1474	34	2 793	=	QGIMTIMR	E6,1733	56	8 56 635		RACDOTMP	E6,1735	56	2 581 585	=
PSKIPADR	16,3604	515	1 510		Q-NORJTS	17,2303	524	3 524		RACTCADR	01,2353	95	1 94	
PSTORE	36,3006	931	- - -		Q-RHCCTR	0042	50	- - -	=	RAD	E3,1646	32	5 661 664	
PIBAD	01,2341	94	3 94		QJUMPADR	E6,1653	54	3 521 530	=	RADAREAD	10,2710	189	1 61	
PTDTRDE	14,3472	405	2 403		QPLAC	E5,1545	45	15 392 448		RADCADR	0371	23	1 98	=
PTITRDE	14,3445	404	1 403		QPLACE	E5,1546	45	62 219 447		RADCK	24,2407	417	1 429	
PTJETLAW	16,3121	506	4 506		QPLACES	E5,1547	45	9 389 467		RADECNTR	23,3000	441	1 440	
PTJMINT6	16,3560	515	3 508 509		QPRET	0052	13	5 7351042	=	RADIN	10,3050	191	1 191	
PULLGCS	22,3546	905	1 891		QRATEDIF	E6,1423	49	2 524 525	=	RADMODES	0412	24	76 61 358	
PULSEIMU	15,3627	364	2 386 390		QRAXIS	17,2002	519	2 518 562		RADNOOP	10,3224	195	2 177 195	
PULSES	7756	474	- - -	=	QRCNTR	0066	52	35 492 634	=	RADSAMP	10,3261	198	2 198 213	
PURGENCY	16,2771	503	1 494		QREADY	E4,1573	35	- - -	=	RADSTALL	13,2745	157	8 198 440	
PURGEOFF	27,2322	682	1 681		QRERAS	0066	599	6 600	=	RANDCHK	37,3032	1089	- - -	
PUSH	00,3231	1027	1 964		QR,1STOO	E6,1656	55	- - -	=	RATEDIF	E6,1437	50	6 524 547	
PUSHLOC	0156	21	29 9041053		QRJOB	20,3532	621	1 624		RATEDSP	23,3072	443	1 443	
PUSHUP	6261	959	1 955		QRJPFILT	21,2757	594	1 594		RATEINAD	21,3620	632	1 632	
PUTADD	05,2307	255	3 255		QRNDXER	0061	603	10 602 603	=	RATEINDX	E3,1652	32	12 67 813	
PUTCOM2	05,3040	270	4 270 272		QRUPT	0042	12	20 1061072	=	RATEINIT	21,3622	633	1 632	
PUTCOM	05,2762	269	8 266 267		QTRANSF	21,3264	600	3 591 592		RATEMAX2	16,3553	515	1 508	
PUTDCSF2	05,3064	271	1 271		QTSN45	15,3072	551	1 542		RATEMAX	16,3552	515	1 507	
PUTDECSF	05,3051	270	2 270		QUADDF	22,2052	876	- - -		RATEMAX+	16,3551	514	1 509	
PUTDPCOM	05,3014	270	1 270		QUADDX	22,2043	876	1 876		RATER	32,2531	919	1 918	
PUTINLST	04,3510	306	2 306 307		QUADZF	22,2077	877	- - -		RATIO	E6,1447	50	- - -	
PUTNORM	05,3023	270	1 269		QUARTA	34,2425	653	5 647 666		RAVEGON	E4,1514	34	6 67 827	=
PUTPUSX	14,2247	385	2 380 397		QUARTER	7747	997	5 5041036	=	RC	E4,1506	37	7 37 886	=
PUTSFNOR	05,3063	271	1 271		QUICKOFF	17,2553	530	1 530		RCALC	21,3474	630	2 629 630	
PUTXY	05,2602	266	- - -		QUICKURG	17,3003	537	2 537		RCD	E4,1774	41	9 326 916	=
PUTXYZ	05,2550	266	- - -		QUITLOOK	E4,1624	44	2 379	=	RCOM	E6,1432	50	- - -	
PWRCNT	0130	20	2 901	=	QUOTTEMP	E6,1727	56	2 550	=	RCOMDOWN	16,2244	491	1 489	
PWRPIR	0107	19	4 900 901	=	**********					RCOMNOOP	16,2246	491	1 489	
**********					ROFS	22,3620	907	- - -		RCOTEMPV	E7,1613	48	3 916 929	
Q	0002	12	364 761095	=	ROVEC	E3,1706	33	2 929 933		RCOV	E4,1737	39	3 916 924	=
Q+10000	5233	948	1 951		ROXS	22,3571	906	1 905		RCSCNTRL	21,2731	593	2 593 634	
Q+1	7015	976	9 77 831		R1D1	4527	302	9 245 285		RCSMON	26,2576	571	1 570	
Q+2	7017	976	5 771050	=	R1VEC	E4,1704	41	5 326 933	=	RCSMONAD	12,3220	570	1 570	
Q+NORJTS	17,2334	525	3 525		R2D1	4530	302	4 245 997		RCSMONEX	5733	572	3 570 572	=
QACCDOT	E6,1533	52	8 495 615	=	R2FS	22,3636	908	- - -		RCSMONIT	12,3166	570	1 108	
QACDOTMP	E6,1733	56	4 56 598		R3D1	4531	302	3 245 255		RCSMONT1	0070	14	3 14	=
QAXIS	E4,1406	38	8 700 916	=	R	E4,1460	36	8 36 895	=	RCSMONT2	0071	14	2 570	=

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SYMBOL	H	DEFINITION	REFERENCES	F		SYMBOL	H	DEFINITION	REFERENCES	F		SYMBOL	H	DEFINITION	REFERENCES	F	
RCSMONT3		0072	14 6 570 572	=		REFLECT		16,3103	506 1 506			REQUESTC		05,3325	283 1 284		
RCSMONT4		0073	14 6 571 572	=		REFRCV		1240	29 4 323 774	=		REREADAC		30,2633	836 3 68		
RCSPURGE		27,2264	681 1 681			REFRRECT		1210	28 5 323 770	=		RERRCALC		17,2637	533 - - -		
RCSVEX		30,3403	847 1 845			REFSMMAT		1262	29 25 678 774	=		RERROR		E6,1470	50 3 52 533		
RCV		E4,1430	34 5 766 792	=		REFTC		1254	29 2 324	=		RESADR		21,3572	631 1 631		
RD		E4,1737	41 4 39 335			REFTCV		1254	29 1 29	=		RESAMPLE		10,3002	190 1 194		
RDBADEND		10,3256	197 5 181 197			REFTOSM1		07,2454	773 1 773			RESET		30,2547	833 2 832		
RDES		E3,1465	31 3 175			REFTOSM		07,2445	773 1 772			RESETCTR		20,3045	585 1 481		
RDESGAIN		10,2636	186 1 185			REFVCV		1246	29 4 323 774	=		RESTAIER		35,2630	460 1 69		
RDIFF		E6,1470	52 3 591 592	=		REFVRECT		1216	28 3 323 324	=		RESTARTS		06,2377	71 1 95		
RDOT		E4,1546	38 6 701 918	=		REFXKEP		1260	29 2 324	=		RESTEST1		35,2650	461 - - -		
RDOTBIAS		10,3160	194 1 191			REGRSAMP		11,2414	212 1 200			RESTORE1		37,2213	1080 - - -		
RDOTD		E4,1440	38 6 701 917	=		REGSLEEP		13,2432	149 1 149			RESTORE2		37,2241	1081 - - -		
RDR1		14,3113	399 1 409			REGUP		6277	959 3 959			RESTORE3		37,2267	1081 - - -		
RDR37511		14,3105	399 1 381			REJALARM		13,3936	167 1 166			RESTORE		24,3062	424 2 424 425		
RDRDFREE		11,2446	212 - - -			REJECT2		13,3454	167 3 166 167			RESTOREA		24,3070	425 8 423		
RDRINIT		14,3143	399 1 211			REJECT		13,3441	167 1 167			RESTORSR		13,3573	230 2 229		
RDRLOCS		10,3340	199 1 199			REJIN		13,3432	167 1 166			RESTRTCS		E3,1600	33 4 466		=
RDRPIBB		4062	61 1 60			REL		0065	57 11 501 502	=		RESULTCT		E5,1673	45 14 412 425		=
RDRREIN		14,3717	409 1 399			RELDSP1		4711	308 2 275 291			RESUME		5733	1072 48 61 633		
RDS		22,3571	905 2 884 885	=		RELDSP2		4701	308 3 308			RETBURN		36,2257	743 1 909		
RDSP		E5,1570	45 - - - -	=		RELDSP		4666	308 6 241 284			RETBURNL		22,3714	909 1 892		
RDUM		0010	37 5 894 904	=		RELDSPON		4601	303 2 277 307			RETIGN1		22,2210	880 3 878 895		
READACCS		30,2047	819 2 818 819			RELREI		0134	21 3 308	=		RETIGN2		22,2615	886 7 878 897		
READCDUK		35,3513	654 2 645 646			RELTAB11		4313	105 1 106			RETNON		12,2377	115 1 116		
READCDUS		15,3473	360 2 178 183			RELTAB		4300	104 4 107 279			RETNTLZ		E4,1406	36 3 36 880		=
READCHK		37,3010	1089 - - -			REMARK		13,3355	166 5 164 167			RETOVF12		22,2555	886 1 893		
READOUT		24,2362	416 1 416			REMODE		10,2115	174 1 182			RETPREB		36,2035	740 1 909		
READPIPS		15,3502	360 1 360			RENDRAD		10,3015	190 1 189			RETPREBL		22,3712	909 1 891		
RECAL1		04,3446	290 2 290			REPEAT1		30,3070	841 1 841			RETROOT		0122	20 2 900 902		=
RECAL2		04,3457	291 2 291			REPIP1		30,2612	836 1 837			RETSAVE		1304	40 2 839 841		=
RECAL3		04,3464	291 1 290			REPIP3		30,2620	836 1 837			RETTHRT		E4,1410	36 1 36		=
RECALTST		04,3440	290 2 268 284			REPIP4		30,2624	836 4 836 837			RETTTFNU		22,2233	880 3 876 877		
RECTIFY		07,3500	792 2 772 791			REPOSRPT		10,2074	173 1 175			RETXIGN1		E4,1407	36 3 36 897		=
REDOZ.61		27,2230	680 1 65			REQADD		05,2255	251 1 251			REVCNT		6306	959 2 959 997		
REDOZ.63		27,2243	680 1 65			REQCOM		05,2257	255 2 255			RFAILCNT		E7,1446	47 2 198 212		
REDO3.11		31,2037	801 1 66			REQDAIX		05,2252	255 3 266 267			RFAILS2		05,3522	312 1 311		
REDO3.27		35,2651	461 2 66 390			REQDAIY		05,2254	255 3 266 267			RFAILS		04,2443	246 1 246		
REDO5.31		30,2070	819 1 69			REQDAIZ		05,2256	255 3 251 267			RGIMADR		17,2155	522 - - -		
REDO		11,2331	210 2 210			REQEXT		05,3321	283 1 283			RGIMBITS		16,2454	495 1 495		
REDOCTR		1356	90 3 88 336	=		REQEXLOC		05,2166	252 - - -			RGIMTIMR		E6,1754	56 7 366 521		=
REDOMDUE		31,2131	805 1 64			REQMM		05,3302	283 1 282			RGOODEND		10,3251	197 4 190 197		
REDYIQRK		14,3726	410 1 419			REQRET		0304	22 10 98 805			RMCMON		11,2712	218 - - -		

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RHCMONVN	11,2716	218	1 218	ROTANGLE	30,2774	840	1 839	RRTARGET	0414	24	4 178 399 =
RHCP	0042	12	- - - =	ROTRATE	17,3613	549	1 549	RRTONLY	10,2150	175	3 173 174
RHCR	0044	12	- - - =	ROTVBZ4	13,3170	161	3 161	RRTURNON	10,2000	171	1 132
RHCY	0043	12	- - - =	ROUND	00,2116	1001	1 964	RRUSE	0010	15	- - - =
RIGHI5	4532	302	5 268 288	ROUNDSUB	7210	982	4 994 1007	RRUSEFLG	7755	177	4 171 396 =
RIGHT	00,2236	1006	11008	RPZ	E4,1502	36	4 36 882 =	RRZZ	10,2305	177	1 177
RIGHTGTS	35,2746	464	1 464	RP	E4,1754	41	3 525 737 =	RRZERO	10,2250	177	4 203 439
RIGHT-	00,2332	1008	11005	RPCHKFIN	37,3603	1098	11096	RRZEROK	11,2117	203	1 201
RIGHTR	00,2031	999	11007	RRIAX2	10,2163	175	1 175	RRZEROSB	10,2013	172	2 171 177
RIG-2SEC	E4,1530	34	1 773 =	RRIAX15	10,2155	175	1 175	RS	E4,1510	37	18 37 886 =
RIGNTION	E4,1400	34	2 773 828 =	RRANGLES	15,3355	357	1 178	RSAMPDT	E7,1445	47	5 198 214
RINJECT	E7,1435	47	1 701	RRATEDIF	E6,1424	49	5 524 525 =	RSAMPTST	11,2416	212	1 212
R-Q+CHKR	17,2347	525	1 525	RRAUTCHK	12,3054	132	- - -	RSBBQ	E3,1774	33	1 92
R-Q-CHKR	17,2316	524	1 524	RRCDUCHK	12,3115	133	3 132	RSDTTEMP	1342	29	7 69 753
R-RHCCTR	0044	50	- - - =	RRDESDUN	10,2017	186	1 186	RSEMIAUT	11,2501	214	1 212
R-,CHKDB	17,2365	525	1 524	RRDESK2	11,2256	207	1 207	RSQ	E3,1650	32	- - -
RMAG	1046	26	7 701 918	RRDESNB	10,2364	181	3 207 440	RSTACK	E7,1447	47	17 198 300
RMODINIT	01,2575	99	1 98	RRDESNBK	11,2234	207	1 201	RSTGTS1	35,2020	452	1 68
RMODINV	10,2142	174	7 174 181	RRDESSM	10,2307	178	1 399	RSTKLIST	11,2477	213	1 212
RN1	1050	26	3 822 889	RRECT	E4,1400	34	14 766 792 =	RSTKLOC	E7,1444	47	16 198 222 =
RN	1010	26	16 337 911	RRETURN	E4,1446	38	2 911 912 =	RSTRTWRD	1127	27	2 76 88
RNRAD	0046	12	4 190 191 =	RRGIMON	12,3135	134	1 133	RTB	01,2732	1041	11041
RNVNSTOR	22,2720	889	- - -	RRIMUDIF	11,2107	202	1 201	RTB/BHIZ	01,2731	1041	1 963
ROADBACK	10,2303	177	5 177 196	RRINDEX	E3,1466	31	3 175	RTEMP	E4,1510	37	2 895 =
ROLL	E3,1475	31	- - -	RRLIMCHK	4334	169	5 134 181	RTJETADR	17,2607	531	- - -
ROLLRATE	34,3754	672	2 672	RRLIMOK	4372	169	1 169	RTJETIME	17,2376	525	1 531
ROLLSTAL	34,3743	672	1 672	RRNB	15,3430	359	1 181	RTNHOLD	E5,1574	42	3 851 =
ROOT1/2	24,3663	434	5 431 432	RRNBSW	0011	15	3 178 183 =	RTRANSF	21,3274	600	3 591 592
ROOT1SQ	24,3664	434	1 432	RROFF	12,3107	132	1 132	RTRNCADR	06,2005	63	5 71 75
ROOT2SQ	24,3665	434	1 432	RROPRDLY	23,3170	446	2 440	RTSTBASE	E7,1443	47	3 198 213
ROOT3SQ	24,3666	434	1 432	RROUT2	10,2215	176	1 176	RTSTDEX	E7,1441	47	6 198 214
ROOTBCK	5460	1047	11047	RROUT	10,2213	176	2 175 186	RTSTLOC	E7,1444	47	4 47 212
ROOTLOOP	22,3423	901	2 902	RROUTLIM	10,2242	176	1 176	RTSTMAX	E7,1442	47	3 198 213
ROOTMU	36,3661	945	1 939	RRRANGE	10,2651	187	1 199	RTSTNV	11,2476	213	1 212
ROOTNEXT	16,3311	508	1 509	RRRATFPS	23,3005	441	1 440	RUN	E5,1550	45	16 391 448
ROOTPS	0116	19	5 901 902 =	RRRDOT	10,2647	187	1 199	RUPTAGN	1076	26	6 261076
ROOTPS+1	0117	19	- - - =	RRRET	E3,1464	31	11 168 195	RUPTCHK	37,2732	1088	11088
ROOTPSRS	22,3352	900	1 885	RRSCALUP	10,2560	185	1 185	RUPTCON	37,2763	1088	11089
ROOTRET	1131	27	8 271048	RRSIM2	15,3636	365	- - -	RUPTREG1	0070	14	70 14 889
ROOTSTOR	22,3463	902	3 902	RRSIM	15,3634	365	2 365	RUPTREG2	0071	14	37 52 826
ROPECHK	37,3340	1094	3107 91096	RRSIMG	15,3706	365	2 365	RUPTREG3	0072	14	27 52 950
RORCHK	37,3018	1089	- - -	RRSONLY	10,2153	175	2 173 174	RUPTREG4	0073	14	20 14 950
ROT180	34,2051	645	1 645	RRSPGAIN	10,2212	175	1 175	RUTMXTAB	23,2475	301	1 294

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SYMBOL H	DEFINITION	REFERENCES F
RUIMXTEM	0143 21	2 268 294
RV33	11,2527 214	2 214 220
RVU	00,3256 1027	1 964
RVSTOR	22,2722 889	1 889
RVUPDADR	33,3473 738	1 729
RVUPDATE	07,2336 771	2 738 751
RWAITK	11,2122 203	2 203 207
RXORCHK	37,3046 1090	- - -
RY	E4,1550 38	2 914 =
/ACF/	1322 29	2 852 892 =
/AFC/	E4,1562 37	10 37 897 =
/AFC/CR	22,3542 905	1 896
/AFC/OLD	E4,1564 37	4 37 897 =
/AF/	1324 29	3 844 853 =
/AGREE	00,2757 1021	11020
/BUF+	00,2671 1019	21018
/BUF-	00,2665 1018	21018
/MPAC+	00,2746 1020	21020
/MPAC-	00,2742 1020	21020
/NORM2	00,2704 1019	11019
/NORM	00,2711 1019	11019
/TEMP1/	0376 23	3 481 586
/TEMP2/	E6,1756 56	3 523 586
/TEMP3/	E6,1757 56	2 523 586
/TEMP5/	E6,1761 56	2 523
S10BITS	5337 1077	210911092 =
S11CHAN	37,3632 1098	210991100
S13BITS	37,2010 1077	510851096
S1	0050 13	35 1781039 =
S2	0051 13	17 340 794 =
S8BITS	4564 1077	210801096 =
S+1	7763 1077	2510801100 =
S+2	7762 1077	710811090 =
S+3	6311 1077	410791089 =
S+4	7761 1077	11090 =
S+5	7766 1077	210821090 =
S+6	6306 1077	11090 =
S+7	7765 1077	210791086 =
S+MAX	37,3505 1096	1610801090
S+ZERO	7767 1077	1510781098 =
SAC	E5,1474 44	- - -
SAMEASK1	34,3345 665	1 665
SAMEJETS	16,2747 502	1 502
SAMODCHK	23,2556 437	1 210
SAMODKIN	23,3236 447	1 398
SAMPLIM	0413 24	9 98 195
SAMPLSUM	0414 24	6 24 198
SAMPSUM	0414 24	- - - =
SAMPTIME	0013 12	3 300 304 =
SAUTLOCS	14,3361 403	1 403
SAUTOIFS	14,3347 403	1 210
SAVDT	1150 28	3 800
SAVE	E5,1620 45	15 418 421 =
SAVERASE	E5,1506 48	13 42 48 =
SAVRATEQ	E6,1622 54	4 54 609
SAVRATER	E6,1623 54	2 517 588 =
SAXIS	E4,1414 38	6 701 915 =
SBIT10	1752 1077	- - - =
SBIT11	1751 1077	210941096 =
SBIT12	1750 1077	11095 =
SBIT13	1747 1077	- - - =
SBIT14	1746 1077	410851088 =
SBIT15	1745 1077	210811096 =
SBIT1	1763 1076	- - - =
SBIT2	1762 1076	- - - =
SBIT3	1761 1076	- - - =
SBIT4	1760 1076	11093 =
SBIT5	1757 1076	- - - =
SBIT6	1756 1076	- - - =
SBIT7	1755 1076	11096 =
SBIT8	1754 1077	- - - =
SBIT9	1753 1077	210801093 =
SBLANKS	37,3650 1099	11100
SBNK03	5634 1077	11095 =
SBNKOPIN	37,3604 1098	11078
SBORB10	25,2354 693	1 693
SBORB11	25,2371 693	1 693
SBORB12	25,2402 693	1 693
SBORB13	25,2413 694	1 694
SBORB14	25,2424 694	1 694
SBORB1	25,2021 687	2 687
SBORB2	25,2035 687	1 687
SBORB3	25,2204 690	1 690
SBORB4	25,2222 690	1 690
SBORB5	25,2243 691	1 691
SBORB6	25,2254 691	1 691
SBORB7	25,2265 691	1 691
SBORB8	25,2307 692	1 64
SBORB9	25,2340 693	1 692
SBORBA	25,2163 690	1 64
SBORBB	25,2320 692	1 695
SBUSY	37,3601 1098	11097
SCADR	37,3533 1097	11098
SCALADJ	10,3101 193	1 191
SCALCHNG	10,3067 191	1 191
SCALDELT	07,2213 767	- - -
SCALEA	E4,1606 35	3 784 787 =
SCALEB	E4,1607 35	6 784 788 =
SCALEBND	17,3115 538	4 538 539
SCALECHK	10,3040 191	1 190
SCALEDOT	16,3111 506	1 506
SCALEDT	07,2214 767	- - -
SCALEDTP	16,2324 493	1 493
SCALEFAC	30,3533 852	1 850
SCALER	07,2212 767	- - -
SCALFTR	14,3722 409	1 390
SCALSAV	E3,1510 31	4 224 226
SCALTJET	16,3316 509	1 507
SCAXIS	E3,1663 32	11 645 926
SCHOCT23	35,3334 471	1 453
SCHZEROS	35,3277 470	2 429 465
SCLRAVMD	07,2233 768	1 766
SCLRMDAV	07,2237 768	4 772 774
SCLVAVMD	07,2241 768	- - -
SCLVMDAV	07,2245 768	- - -
SCNBAZ	24,3670 434	1 429
SCNBVER	24,3702 434	2 429
SCOMP	15,3146 352	2 352
SCOUNT	1366 30	310781094 =
SCOUTEND	04,2663 263	4 263 264
SD	34,2427 653	1 662
SDISPLAY	37,3560 1097	11097
SDSPTAB	37,3644 1099	11099
SECAD	34,2117 646	- - -
SELECTX	23,2537 436	1 436
SELECTY	23,2543 436	1 436
SELECTZ	23,2547 436	1 436

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SYMBOL H	DEFINITION		REFERENCES F		SYMBOL H	DEFINITION		REFERENCES F		SYMBOL H	DEFINITION		REFERENCES F	
SELFADRS	37,2021	1077	2 1097 1098		SETRAIE	20,2072	476	2 689 716	=	SGOT	15,3153	352	1 352	
SELFBANK	5631	1060	1 1060		SETROUND	00,2272	1006	3 1006		SHAFTA	E5,1566	45	- - -	
SELFCHK	37,2115	1079	6 991098		SETRRCTR	10,2224	176	1 176		SHJUMP1	E4,1662	40	3 729 737	=
SELFERAS	1353	30	- - -		SETRRECR	10,2106	173	2 173 179		SHOLTS	05,3462	311	1 310	
SELFRET	1354	30	7 981097	=	SETRSIRT	4105	76	10 452 756		SHORTMP	7357	986	13 242 938	
SELPOSN	24,3407	429	- - -		SETSMART	16,2603	497	1 497		SHORTT	00,2017	999	2 961	
SENDCH	15,2152	332	2 330		SETTSADR	16,2172	490	2 490 491		SHORTV	00,2121	1002	1 961	
SENDCHA	15,2172	333	1 333		SETTIME4	12,2133	107	2 106 107		SHOTIME	4735	308	1 308	
SENDCHB	15,2157	333	1 333		SETTIME5	16,2161	490	1 490		SHOWI	24,3607	433	1 433	
SENDDP	15,2116	332	2 330		SETTRKF	4577	170	4 133 194		SHOW	24,3605	433	6 411 428	
SENDDPA	15,2146	332	1 332		SETUPDSP	35,2000	77	1 77		SHOWLD	24,3576	432	2 411 433	
SENDDPB	15,2127	332	1 332		SETUPER1	35,2664	461	1 459		SHOWSUM	37,3543	1097	1 211	
SENDDSA	15,2222	333	1 333		SETUPER	35,2773	465	2 462 463		SHOWVB	13,3407	166	2 166	
SENDDSB	15,2213	333	1 333		SETUPMSG	11,2634	217	1 200		SHUTDOWN	16,2176	490	1 490	
SENDDSTB	15,2206	333	2 330		SETUPRCK	26,2262	324	2 323 326		SIGN	7707	996	1 962	
SENDID	15,2032	330	2 330 338		SETVAC	05,3336	283	1 283		SIGNANSW	34,3332	665	1 665	
SENDPULS	13,2225	144	1 142		SETWAIER	36,2604	753	1 745		SIGNFIX	04,2762	272	2 271	
SENDSNAP	15,2100	331	1 332		SEVEN	7765	997	21 831097		SIGNMPAC	35,3501	653	16 648 898	
SENDTIME	15,2226	334	1 330		SF1	0072	52	5 595 597	=	SIGNRET	0115	19	- - -	=
SERVEXAD	32,2777	922	1 922		SF2	0073	52	4 595 597	=	SIGNTAG	E6,1716	55	4 506 509	
SERVEXIT	30,2324	824	12 102 922		SFAIL	1357	30	4 246 1078	=	SIGNTEST	04,2334	245	2 244	
SERVICER	30,2133	821	2 68 819		SFCOM	23,2043	295	1 295		SILVER	23,2520	436	1 419	
SETABORT	27,2371	683	1 683		SFCONST1	E5,1663	45	2 419 421	=	SIMPCNTR	E6,1764	56	5 494 635	
SETADR	01,2605	99	1 90		SFCONST	24,3637	434	1 418		SIMPCTRL	21,3722	634	1 634	
SETAUG	04,2625	263	1 262		SFCONUM	05,2734	269	2 261 270		SIMPINIT	E6,1765	56	1 522	
SETCDULM	01,2556	99	1 90		SFINTAB	23,2252	298	1 295		SIMPLOOP	21,3727	634	1 634	
SETCNTR	20,3767	628	1 479		SFINTABR	05,3067	271	1 271		SIMPQADR	21,3721	634	1 634	
SETCOARS	13,2232	144	2 120 141		SFOUTAB	23,2330	299	1 295		SIMPQTRG	21,3726	634	1 634	
SETDVCNT	1341	29	3 480 823		SFOUTABR	05,2525	262	1 261		SIN22.5	17,3324	542	1 542	
SETEI	34,3131	662	1 662		SFRET1	05,2733	268	- - -		SIN27	E7,1603	48	1 911	
SETEBANK	4523	302	2 254 264		SFRET	05,2751	269	- - -		SINBLANK	04,2550	248	1 248	
SETGLOCK	12,2564	121	4 120		SFRUTM1X	05,2721	268	4 254 271		SINCDU	E4,1654	40	10 838 841	
SETIDLE	16,3606	515	1 99		SFRUTNOR	05,2713	268	4 260 271		SINCOSCD	30,3064	841	1 840	
SETISSW	12,2753	129	7 116 147		SFTEMP1	0113	19	16 259 295	=	SINE	00,3511	1032	1 964	
SETLOC	01,3141	1052	3 10 52 1056		SFTEMP2	0114	19	2 273	=	SINOBL	27,3074	727	1 725	
SETMAXDB	20,2054	475	12 100 757		SGNAGREE	15,3520	961	11 226 883		SINTH	0022	44	12 340 407	=
SETMINDB	20,2046	475	5 670 716		SGNCOM	04,2310	244	1 245		SISZ	15,3136	352	1 352	
SETNADD	4521	302	2 251 270		SGNDVOVF	00,2401	1009	1 1009		SIVB1	25,2573	714	1 714	
SETNCADR	4513	302	6 251 302		SGNOFF	0113	19	3 244 245	=	SIVB2	25,2654	715	1 64	
SETOVF2	7224	982	1 978		SGNON	0112	19	3 244 245	=	SIVB3	25,2672	716	1 716	
SETOVF	7153	980	1 1009		SGNTAB	04,2331	245	2 244 245		SIVB3A	25,2712	716	1 716	
SETPD	7645	994	1 962		SGNTOI	04,3000	272	1 272		SIVB3B	25,2733	717	1 716	
SETPIPDT	27,2023	675	1 69		SGNTS11	04,2350	245	3 245		SIVB4	25,2752	717	1 717	

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SYMBOL	H	DEFINITION		REFERENCES	F	SYMBOL	H	DEFINITION		REFERENCES	F	SYMBOL	H	DEFINITION		REFERENCES	F
SIVB5		25,2763	717	1 717		SMALAXIS		20,2564	562	1 561		SPARE		0007	329	- - -	=
SIVBGONE		0032	15	1 844	=	SMALL2		00,3040	1022	11024		SPCOS		5354	1046	3 136 365	
SIVBSEP		25,2555	714	2 713		SMALL		00,3111	1024	11022		SPECPLSI		07,2377	772	1 772	
SIX		6306	997	21 1101077	=	SMANGLSW		0101	15	2 929 940	=	SPECSTS		35,2111	453	1 69	
SIXTY		37,2006	1077	11096		SMAR		36,3146	935	1 931		SPECTEST		01,3131	1052	11056	
SIZCHK		24,3640	434	2 421		SMARSTOR		36,3161	935	- - -		SPEEDY		36,3107	932	3 931 940	
SIZETAB		06,2363	70	2 73 75		SMARTFLG		0377	23	5 496 516		SPLOC		E3,1675	32	17 916 939	
SIZLOOK		24,2466	418	1 418		SMARTJOB		16,2551	497	3 496 497		SPNDX		E3,1653	32	11 668 671	
S-1		7771	1077	210811097	=	SMCDURES		30,3020	840	- - -		SPROOT1		5462	1047	21047	
S-2		5336	1077	210831087	=	SMDCALC		14,2263	385	2 381 398		SPROOT2		5473	1048	11047	
S-3		5340	1077	11083	=	SMD/EREF		15,3043	350	1 394		SPROOT3		5433	1047	11048	
S-4		6156	1077	- - -	=	SMNB1		15,2534	343	- - -		SPROOT		5417	1047	3 553 598	
S-7		37,2016	1077	210781086		SMNB		15,2531	343	6 178 839		SPSBACUP		7745	474	- - -	=
S-MAX		37,3506	1096	310871091		SMODE		1355	30	11 891098	=	SPSBAKUP		17,3526	547	1 535	
S-ZERO		7770	1077	210851094	=	SMODECHK		37,2064	1078	510781094		SPSIN		5355	1046	2 136	
SKEEP1		1371	30	4110771098	=	SMPAC+		00,3366	1030	31029		SPSRCS		21,3417	629	1 547	
SKEEP2		1372	30	1910811100	=	SMTOREF1		07,2133	766	1 766		SPSRCSAD		17,3531	547	1 547	
SKEEP3		1373	30	2710831100	=	SMTOREF		07,2127	766	- - -		SPT		5360	1046	11046	
SKEEP4		1374	30	2310831096	=	SN1		00,3534	1033	11032		SPVAC		5526	1049	3 684 805	
SKEEP5		1375	30	1710781095	=	SNAPLOOP		15,2053	331	1 331		SW		1131	27	21046	=
SKEEP6		1376	30	1810811097	=	SNAPSHOT		15,2046	331	2 330		SWKARG		1132	27	510471048	
SKEEP7		1377	30	2610781096	=	SNGLCD		34,2437	653	1 661		SWRT		00,3167	1026	1 964	
SKIPPAXS		16,2401	494	1 515		SOMEERRR		35,2750	464	1 459		SWRTABRT		00,3364	1029	21029	
SKIPQRAD		17,2474	529	1 530		SOMEKEY		13,3273	163	1 163		SWRTNEG		00,3355	1029	11029	
SKIPQRAX		17,2102	521	1 529		SOMERR2		35,2753	464	1 462		SWRTNM2		00,3456	1031	11031	
SKIPTEST		16,3374	509	1 502		SOMETIME		14,3565	405	1 405		SWRTNORM		00,3463	1031	11031	
SLAP1		01,2000	88	2 253 408		SOPT		37,3525	1097	11096		SWRTSHFT		00,3201	1026	11026	
SLECILAW		E6,1737	56	3 598 634		SOPTION1		37,2105	1079	11079		SWRTSL4		26,2556	553	1 553	
SLEEPIE		35,2717	464	4 452 465		SOPTION2		37,2106	1079	- - -		SWRTSL6		26,2552	553	1 553	
SLEEP5		4550	303	1 280		SOPTION3		37,2107	1079	- - -		SWRTSUB		00,3325	1029	310221034	
SLIPONE		30,2121	820	2 819		SOPTION4		37,2110	1079	- - -		SWRTTEMP		E6,1730	56	6 552 553	
SLOAD2		6542	970	6 360 970		SOPTION5		37,2111	1079	- - -		SWRTTEMQ		E6,1731	56	2 552 553	
SLOAD		6551	970	1 962		SOPTION6		37,2112	1079	- - -		SX		0021	12	54 731097	=
SLOPE1		30,3421	848	1 848		SOPTION7		37,2113	1079	- - -		SXADRS		37,2020	1077	11080	
SLOPE2		30,3425	848	- - -		SOPTION		37,3510	1096	11095		SXDDV		00,2024	999	11022	
SLOPE3		30,3431	848	- - -		SOPTION8		37,2075	1078	21078		SXGHT5		13,3577	230	2 229	
SLOPE4		30,3435	848	- - -		SOPTION10		37,2114	1079	- - -		SXS2		E4,1526	37	3 37 882	=
SLOPE		30,3415	848	1 846	=	SOPTON11		37,3612	1098	- - -		SXS2COMP		22,2332	882	1 882	
SLOPEHI		00,2314	1007	11030		SOUPLY		35,3311	470	- - -		SXTEMP		E6,1727	56	3 56 553	
SLOPELO		00,2172	1021	11031		SOUTHDR		E5,1552	45	5 412 419		SXTEST		00,3437	1031	11030	
SLOPEMP		7743	505	1 504	=	SP3/4		22,3736	909	1 884		SSP		6676	972	1 962	
SLOSHCTR		1336	29	3 88 825		SP3/8		22,3732	909	2 884		STACCDOT		26,3120	615	2 615	
SMA		36,3346	939	1 931		SP9/16		22,3733	909	1 884		STADR		6423	965	1 964	

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STALL	13,2752 157	3 157	STOREDTA	35,3004	466 2 454 466	SW7	01,3000 1045	1 963 =
STAR	E5,1466 44	- - -	STOREEI	34,3141	662 1 662	SWSGN	04,3405 685	1 285
STARAD	E5,1444 44	39 348 429	STOREPL	E5,1551	45 13 381 444	SWSKIP	01,3061 1045	21045
STARM	0040 44	- - - =	STOREIAG	36,3371	939 1 939	SWSTORE	01,3035 1044	21044
STARTDAP	16,2047 488	- - -	STORE,1	6463	967 1 966	SWTAB	04,3434 686	4 285 290
STARTDES	10,2332 179	1 181	STORE,2	6466	967 1 966	SWWORD	0120 20	210431044 =
STARTDT1	35,3572 870	1 869	STORJUMP	6441	966 1 965	SXA	01,2646 1038	1 963
STARTDT2	35,3574 870	1 869	STORRSLT	14,2477	390 3 381 382	SYSTEST	11,2326 210	1 200
STARTDVC	1337 29	3 88 817	STREXIT	E5,1535	48 - - - =	S(X)C(X)	07,2751 781	1 779
STARTEB	01,2564 99	1 96	STRIGYR2	13,2451	150 4 151 154			
STARTSB2	01,2574 96	4 95 101	STRTGYRO	13,2445	150 2 148 153	T2	32,2707 921	1 918
STARTSIM	01,2003 88	- - -	STRTWACH	24,2574	419 - - -	T3	32,2675 921	1 918
STARTSTO	6503 968	- - -	STSHOSUM	37,3335	1094 11097	T3RPTBB	4056 61	1 60
STARTSUB	01,2557 96	2 88 92	STUP2DPS	22,2257	881 - - -	T3RUPT2	01,3602 1071	11072
STARTSW	01,2002 88	- - -	SUBABORT	27,2350	882 1 241	T3RUPT	01,3577 1071	2 60 61
STATE	0074 15	38 151044	SUBIR	00,3663 1035	11036	T4JUMP	12,2134 108	- - -
STATECRI	5204 807	2 801 807	SUHALFA	34,2734	658 1 658	T4LOC	0346 23	8 90 107
STATECTR	1201 28	3 801 807	SUHALFAP	34,2754	659 1 659	T4LOCRST	01,2262 93	1 93
STATEINT	07,2247 769	1 801	SUMRAIEQ	E6,1624	54 6 54 609	T4RPTBB	4063 61	1 60
STATENV	26,2364 326	2 321	SUMRAIER	E6,1625	54 4 517 608 =	T4RUPT	12,2000 104	1 60
STATIME	1326 29	6 337 890 =	SUMTJ	16,3315	508 1 509	T4RUPTA	12,2030 106	2 61 104
STATORN	07,2531 774	1 774	SUNPOS	07,3737	798 1 788	T5ADR	1000 24	24 60 819
STBUFF	E4,1677 41	59 69 336	SUNVEC	07,3746	798 1 798 =	T5IDADR	16,3640 516	1 515
STCOUNT	E4,1715 41	6 321 336	SUPDACAL	5245	949 11094	T5IDLER	16,3626 515	1 516
STCTR1	26,2726 612	1 613	SUPER011	5550	998 - - -	T5IDLERI	16,3627 516	1 488
STCTR	26,2723 612	1 612	SUPER100	7755	998 - - - =	T6ADR	5050 484	1 60
STDESIG	10,2432 182	2 174 182	SUPERBNK	0007	59 5 949 952 =	T6JOB	6017 484	1 512
STEERAD2	E6,1742 56	3 634	SUPERSW	5333	952 - - -	T6JOBCHK	6013 484	6 484 576
STEERADR	E6,1544 53	4 574 633	SUPRCON	37,2007	1077 11096	T6NEXT	1002 25	23 484 514
STEPDLYT	E4,1525 43	1 374 =	SVCT3	5716	1065 3 3031065	T6NEXTJT	1004 25	17 484 514
STEPEXIT	E4,1604 35	3 770 794 =	SVEXIBAD	27,3332	758 2 755 762	T6NXT=+	16,3507 514	1 513
STILLOOK	24,2624 420	1 420	SVEXADRS	27,2442	682 2 675 =	T6NZERO	6032 484	1 484
STILLRCS	17,2715 535	4 533 594	SVEXIIAD	27,2442	684 1 682	T6OFFNOW	16,3410 513	1 512
STOPDVC	1340 29	2 88 480	SVREXIT	25,3012	719 1 714	T6ONNOW	16,3426 513	2 512
STOPRATE	20,2114 476	11 100 922	SWBIT	0121	20 510431045 =	T6RPTBB	4055 61	- - -
STOPSMRT	16,2562 497	2 497	SWBRANCH	6773	975 11045	TABLNTH	12,2105 107	1 107
STOPTEST	24,2765 422	2 420 421	SWCALL	5212	948 3 94 403	TABLTTF	E4,1433 36	8 36 909 =
STORCDUY	E6,1540 53	9 575 633	SWINIT	01,2576	99 1 89	TABLTTFL	22,3710 909	1 885
STORCDUZ	E6,1541 53	1 580	SWITCH	E5,1536	48 - - - =	TABPLACE	0146 57	18 618 624 =
STORCOM	5064 799	5 570 800	SWITCHES	01,3000 1043	11045	TAD	7142 980	1 962
STORE1	6701 972	11004	SWINJS	20,3654	623 1 622	TAG5	E7,1621 48	3 916 933
STORE2	34,3150 663	1 662	SWRETADR	17,2264	524 1 522	TAGSUB	01,2723 1040	410381039
STORE	6471 967	6 966	SWRETURN	5221	948 8 63 868	TANG	0422 24	23 24 440

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TANOBL	27,3100 727	2 725		TE	1256 29	5 324 774 =		TESTLODX	22,3457 902	1 902	
TAR1	14,2356 387	1 388		TEM1	0131 20	5 201022		TESTLOOP	07,2153 767	5 769 773	
TAR/EREF	14,2350 387	3 384 399		TEM2	0132 20	8 20 365		TESTMASS	16,2207 490	1 488	
TASK1	35,3376 870	1 869		TEM3	0133 20	1 20		TESTNN	05,2037 251	1 277	
TASK2	35,3603 870	1 870		TEM4	0134 20	3 21		TESTNO	E5,1563 45	15 418 440	
TASKOVER	5727 1072	127 1101100		TEM5	0135 21	1 21		TESTNV	11,2402 211	1 210	
TASKSETR	33,2663 708	2 733		TEMK	1130 27	101046 =		TESTOFUF	04,3113 274	4 271 276	
TAU	E4,1560 34	1 776 =		TEMP2G	0145 76	9 71 75 =		TESTONL1	16,3302 508	2 508	
TAVEGON	E4,1510 34	4 675 827 =		TEMP	E5,1575 45	8 403 406 =		TESTONL2	16,3370 509	2 509	
TAZEL1	E5,1553 45	4 387 391		TEMPACC	0150 57	5 618 619 =		TESTPCTR	21,3715 634	3 593 635	
TBASE1	1113 27	4 72 87		TEMPADD	E5,1574 45	5 405 406 =		TESTPOL	16,2710 501	3 501 502	
TBASE2	1115 27	2 799 800		TEMPAOS	0147 57	3 619 =		TESTTIME	24,3644 434	1 411	
TBASE3	1117 27	1 747		TEMPBB	0064 83	1 82 =		TESTV6	05,2033 250	- - -	
TBASE4	1121 27	- - -		TEMPBBCN	0073 83	6 82 84 =		TESTXACT	11,2040 200	8 203 216	
TBASE5	1123 27	2 680 819		TEMPERR	0062 57	- - - =		TET	E4,1446 34	8 295 875 =	
TBASE6	1125 27	- - -		TEMPG2	0071 83	3 81 84 =		TEVENT	1311 29	6 336 676 =	
TBRIGAL	22,2124 878	1 876		TEMPG	0061 83	11 82 87 =		TF	E3,1671 32	2 929 931	
TBRL	0003 876	- - - =		TEMPINER	E6,1451 50	3 613 =		TFACT	36,3667 945	1 929 =	
TBRLING	22,2134 878	4 876 877		TEMPNET	0151 57	7 618 627 =		TFL	E4,1542 38	3 916 929 =	
TBRQUAD	22,2130 878	3 876 877		TEMPNM	0063 83	3 82 85 =		TGENTRY	21,2761 594	1 594	
TBUP	E4,1426 38	7 917 924 =		TEMPOK	12,2625 122	2 122		TGO	E4,1540 38	25 701 921 =	
TCILMP	31,2220 809	1 809		TEMPP2	0072 83	5 81 84 =		TGOEST	33,2636 707	1 701	
TC	E4,1444 34	5 766 794 =		TEMPP	0062 83	6 82 84 =		TGOFF	11,2541 215	1 69	
TC+TCF	37,2116 1079	11079		TEMPPHS	0144 76	9 71 75 =		TGOFFCAL	21,3307 602	2 635	
TCALARM2	37,2040 1078	- - -		TEMPPR	0070 83	2 82 84 =		TGOFFNOW	21,3373 603	3 602 603	
TCFENDUP	31,2164 808	1 809		TEMPSW2	0066 83	4 81 84 =		TGONOM	E7,1577 48	1 911	
TCFINDVC	4562 303	1 283		TEMPSW	0065 83	7 81 84 =		TGRR	E3,1736 33	17 64 681	
TCGP2OFF	27,3262 756	1 762		TEMPSWCH	0147 76	3 71 75 =		TMBUF	E4,1405 43	2 378	=
TCNOVAC	5723 303	1 283 =		TEMPTIME	E5,1561 45	4 389 675		TMCOMM1	E4,1630 43	1 378	=
TCO	E4,1452 38	5 912 923 =		TEMX	1155 28	12 828 839 =		TMCOMM2	E4,1636 44	1 377	=
TCO+15	33,2571 706	1 706		TEMXY	1160 28	- - - =		TMETA	0024 44	7 342 409 =	
TCO+5	33,2554 705	2 705		TEMY	1156 28	2 835 837 =		TMETAADR	14,3720 409	1 407	
TCOUNTFC	22,3216 896	1 896		TEMZ	1157 28	4 835 837 =		TMETAD	0400 23	28 141 447	
TCQ	7020 77	3 77 308 =		TEN	4570 997	9 971098 =		TMETALLD	23,3103 444	11 437 438	
TCQBNK00	00,3436 1030	11030		TENMS	37,2740 1088	11088		TMETAN	E5,1624 46	13 459 465 =	
TCSUBTR	00,3711 1036	11034		TEPHEM	E3,1753 33	2 678 724		TMETASM	36,3502 941	1 940	
TCISKOVR	5717 303	- - - =		TERMA	E6,1510 51	22 507 589		TMETAX	E5,1616 46	2 460 461 =	
TCWAIT	4561 303	1 284		TERMB	E6,1511 51	7 540 589		TMIRTEEN	00,3127 1024	11022	
TDEC	E4,1566 34	151 35 828 =		TERMEXIV	11,2055 201	8 204 216		TMISCH32	1163 28	4 88 570	
TDECSTOR	07,2435 773	1 773		TEST	01,3047 1045	11045		TMISP1	36,3144 934	1 934	
TDECTEMP	1304 29	15 63 740 =		TESTCADR	11,2361 210	1 210		TMISPOLY	0065 57	8 556 560 =	
TDELTAV	E4,1414 34	5 766 794 =		TESTCALL	24,2455 418	4 418 422		TMLD1	23,3111 444	1 444	
TDI	E4,1665 40	4 728 730		TESTCNTR	21,3404 603	1 632		TMR1COMM	06,3433 378	1 378	

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SYMBOL	H	DEFINITION		REFERENCES	F		SYMBOL	H	DEFINITION		REFERENCES	F		SYMBOL	H	DEFINITION		REFERENCES	F	
THR1TIME		E4,1622	43	1 378		=	TIG-7.5		36,2116	142	- - -			TMFAIL2		13,3564	229	2 230		
THR2COMM		06,3405	377	1 378			TIGN		E4,1667	40	10 336 891			TMFI		E3,1601	32	9 647	648	=
THREE		6311	997	43 751	100	=	TIGNTION		E4,1776	41	3 773 912		=	TMINAPS		E6,1763	56	4 523	586	
THREE/8		07,3675	797	2 786	797		TILT		E3,1747	33	2 679			TMINAT16		16,3557	515	- -	-	
THROTADD		14,3372	403	1 405			TIMAR		E3,1512	31	9 224	226		TMINDEX		E7,1402	47	14 331	887	
THROTASK		14,3503	405	2 404	405		TIME1		0025	12	20 61	869	=	TMIS		E3,1601	32	13 32	647	
THROTCOL		22,3716	909	1 892			TIME2		0024	12	36 74	856	=	TMTSK		30,2477	832	1 834		
THROTCON		30,3476	851	1 909			TIME3		0026	12	5 961	071	=	TNONTEST		12,2342	114	1 112		
THROTDT		30,3464	850	2 852	858		TIME4		0027	12	5 961	088	=	TNUV		E4,1422	34	4 766	794	=
THROTON1		06,3425	378	1 377			TIME5		0030	12	19 96	820	=	TOADSTSK		16,3746	518	1 517		
THROTON		06,3443	378	2 377	378		TIME6		0031	12	11 484	514	=	TOCON2		4222	82	1 83		
THROTOVR		30,3705	857	2 858			TIME		E4,1506	38	4 918	919	=	TOFJTCHG		E6,1475	51	21 498	589	
THRSBITS		14,3670	409	- -	-		TIMECONV		36,3046	932	2 931	932		TOJTLST		17,2544	530	4 530		
THRSHLD+		30,2316	824	1 823			TIMEDIFF		E3,1514	31	2 226			TOOBAD		34,2771	660	2 646		
THRSTART		06,3373	377	1 368			TIMEDONE		21,3707	634	1 575			TORK		23,2530	436	1 436		
THRSTLOC		25,2472	695	1 695			TIMEHOLD		0420	24	8 188	715		TORKJET1		26,3164	616	2 612	613	
THRTSTEP		E4,1605	43	13 377	378	=	TIMELONG		36,3510	941	1 941			TORKJET		26,3162	616	1 612		
THRUST		0055	13	5 88	855	=	TIMEOFFQ		E6,1536	52	- -	-		TORKTABL		20,2607	563	2 557		
THRUSTLO		30,2456	823	1 823			TIMEOFFR		E6,1537	52	- -	-		TORKX		23,2553	436	1 436		
TIG11		36,2211	742	1 64			TIMER		E5,1624	45	2 420		=	TORKY		23,2554	436	1 436		
TIG11+26		36,2233	743	1 743			TIMESAV		E3,1506	31	5 224	226		TORKZ		23,2555	436	1 436		
TIG11A		36,2222	743	1 743			TIMESTEP		07,3450	791	2 767			TORQGYRS		11,2265	208	1 200		
TIG11-15		36,2172	742	- -	-		TIMETEST		06,2447	72	1 75			TORQGYRV		11,2301	208	1 208		
TIG11-16		36,2166	742	- -	-		TIMEWACH		24,2633	420	1 420			TORQINCH		35,2700	461	- -	-	
TIG11-20		36,2163	742	- -	-		TINT		E4,1772	41	2 326	916	=	TORQNLX		E5,1574	46	6 411	464	=
TIG11-30		36,2120	741	5 63	740		TIX		01,2677	1039	1 963			TORQUE		24,2102	412	1 463		
TIG13		27,3232	756	- -	-		TJETADR		0062	57	3 535	631	=	TORQUEVK		20,3105	587	3 585	589	
TIG13-30		27,3175	755	1 754			TJETLAW		17,3533	548	2 515	532		TOSMODE		37,3615	1098	21098		
TIG4-15		33,2443	704	- -	-		TJETSCAL		17,3742	551	1 548			TP		E6,1611	53	14 53	509	
TIG4-16		33,2437	703	- -	-		TJETSIGN		E6,1434	50	7 501	509		TPAGREE		7327	986	10 1481	009	
TIG4-30		33,2431	703	- -	-		TJSR		E6,1217	52	- -	-		TPDVL		6666	972	1 972		
TIG4-34		33,2416	703	2 64	703		TJSUM		17,3741	551	- -	-		TPIP		E4,1446	36	9 36	899	=
TIG4-36		33,2377	703	1 702			TKNOWN		33,2313	701	1 918			TPIPOLD		E4,1450	36	5 36	896	=
TIG4-37		33,2364	702	- -	-		TLIFTOFF		E3,1740	33	2 680	724		TPLEFT7		04,3072	273	2 264	273	
TIG4-41		33,2351	702	2 64	700		TLIM		12,2614	122	1 113			TPMODE		15,3541	361	1 678		
TIG4-48		33,2167	699	- -	-		TLOAD		0546	970	2 654	962		TPRELTER		1343	29	4 675	676	
TIG4-49		33,2164	699	1 699			TM		E3,1644	32	4 667	669	=	TPSL1		4611	304	4 271	273	
TIG4-51		33,2101	698	- -	-		TMALM		5733	230	1 229		=	TPUSH		00,3254	1027	11027		
TIG4-7.5		33,2447	704	- -	-		TMANUCHK		34,3552	669	- -	-		TQR		E6,1612	53	16 488	589	=
TIG4IST		33,2460	704	1 704			TMARK		E5,1564	45	7 383	461		TQRGTIMI		17,2464	529	1 529		
TIG9-0		33,3230	733	2 67	733		TMESTORE		36,3475	941	5 940	941		TR1		06,3355	376	1 375		
TIG9-66		33,3134	732	3 67	731		TMEXITL		15,2143	332	- -	-		TRACE1		04,3150	278	- -	-	
TIG-30		25,3016	719	2 715			TMFAIL1		13,3571	229	- -	-		TRACE1S		04,3161	278	- -	-	

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IRAN4JET	20,2506	560	1	560			IRST90PC	25,2464	695	2	692			TIGO	E4,1745	41	12	67	918
IRANCNTD	20,2524	560	1	559			IRUNA	E5,1567	45	-	-	-		TIHRUST	E4,1663	40	2	729	730 =
IRANCONT	20,2526	560	3	559	560		IRYCOUNT	10,2716	189	-	-	-		TOLLG	E4,1456	36	3	36	891 =
IRANNEXT	20,2466	559	1	561			IRYGIMBL	7762	474	2	474	593 =		TUMB1	25,2070	688	1	688	
IRANONLY	0070	57	3	528	559 =		IRYGTS	21,3573	632	1	532			TUMB2	25,2121	689	1	689	
IRANOROT	20,2510	560	1	560			IRYGTSAD	17,2616	532	1	532			TUMB3	25,2143	689	1	689	
IRANPOLY	20,2676	565	1	559			IRYSWN	10,2403	181	1	181			TUMBCHK	25,2061	688	1	688	
IRANSAVE	0073	57	5	528	560 =		IRYSWS	10,2352	180	1	178			TUMBL3/4	27,2414	683	1	683	
IRANSLAT	20,2535	561	2	560	561		ISCALE	7750	909	3	881	896 =		TUMBLCHK	33,2063	698	2	698	
IRANSM1	E5,1720	46	4	412	456 =		ISCALINV	22,3720	909	2	887	890		TUMTASK	30,2470	832	3	66	683
IRANSNOW	0072	57	7	528	561 =		ISELECT	11,2350	210	2	210	414		TUPBUSY	31,2276	811	2	811	
IRANSPOS	35,3447	651	1	646			ISKADRS	37,2776	1089	11088				TURNOFFQ	16,2433	495	1	494	
IRANSPSE	15,3031	350	2	394			ISKOVCDR	01,3672	1074	11074				TURNOFFR	16,2443	495	1	494	
IRANSTOR	20,2514	560	1	559			ISLC2	00,2172	1004	1	994			TWEEKIT	E3,1724	33	4	929	942
IRANTOSM	07,2516	774	1	774			ISLC	7650	994	1	962			TWENTYMS	16,3754	518	1	492	
IRANUSED	20,2542	561	2	560			ISLCLOOP	00,2201	1004	11004				TWINEXIT	16,2514	496	1	496	
IREF	E4,1454	38	2	918	919 =		ISLCTEST	00,2207	1004	11004				TWO	7762	997	110	611098 =	
IRESUME	E4,1512	34	-	-	- =		ISSL	00,2101	1001	3	9991008								
IRIG1	15,2511	342	1	342			ISSR	00,2025	999	-	-	-		U1POS	34,2345	650	1	649	
IRIG2	15,2522	342	1	342			ISTAB	04,2411	246	1	246			U2POS	34,2321	649	1	649	
IRIGFNS	36,3163	936	1	931			ISTCON1	05,3457	310	1	310			U3POS	34,2371	650	1	650	
IRIMCNTR	E6,1744	56	8	494	635		ISTCON2	05,3460	311	1	310			U	E6,1445	50	-	-	-
IRIMCODE	06,3363	376	1	375	=		ISTCON3	05,3461	311	1	311			ULLAGE	20,2062	475	9	686	756
IRIMGIMB	01,2567	99	1	96			ISTFORDP	05,2420	260	1	259			ULLAGER	7756	474	4	475	557 =
IRIMIND	E4,1571	43	1	375	=		ISTLOAFC	22,3213	896	1	896			ULL/+X	20,2340	555	-	-	-
IRIMMASK	06,3364	376	2	374	375		ISTLTS1	05,3462	310	1	310			ULOW	21,3461	629	1	629	
IRIMOFF	06,3265	374	1	375			ISTLTS2	05,3463	311	1	310			ULOWR	21,3532	631	1	630	
IRIMOFFT	E4,1555	43	1	375	=		ISTLTS3	05,3470	311	1	311			UMPAC+	00,3150	1025		21025	
IRIMON1	06,3321	375	2	375	376		ISTORE	6523	968	1	968			UMPAC-	00,3142	1025		21025	
IRIMON	06,3306	375	2	375			ISTUPLOK	13,3556	229	2	229			UNAFC/2	E4,1566	37	9	37	897 =
IRIMONI	E4,1541	43	1	374	=		ITEMP	E3,1605	32	11	668	672 =		UNAFC/20	E4,1574	37	4	37	894 =
IRIMSET	06,3300	374	1	374			ITIFINCR	22,2234	880	6	876	898		UNAJUMP	00,2000	964	1	961	
IRIMSTEP	E4,1510	43	12	374	375 =		ITIFLIN/4	E4,1610	37	2	898	899 =		UNIT	00,3002	1022	1	964	
IRIMTOP	06,3253	374	1	368			ITIF/4	E4,1452	36	21	36	899 =		UNITDV	00,3131	1025		31023	
IRKFLCDU	12,3134	133	-	-	-		ITIF/4CL	22,2442	884	2	878			UNITR	1032	26	15	700	919
IRKFLON	4416	170	2	170			ITIF/4CR	0005	876	1	887	=		UNITVG	E4,1671	40	3	729	737
IRKOFF	10,2626	186	2	186			ITIF/4NOR	22,3611	907	-	-	-		UNITW	1040	26	2	842	
IRMCHECK	17,2107	521	1	519			ITIF/4NOX	22,3562	906	1	905			UNKNOWN	0007	329	-	-	- =
IRMDMY13	27,3505	762	2	67	762		ITIF/4NU1	22,3640	907	-	-	-		UNNORM	E3,1714	33	2	924	944
IRNRESET	20,2540	561	1	561			ITIF/4NU2	22,3647	908	-	-	-		UNR1	E3,1700	32	5	933	944
IRNSPSPD	35,3456	651	2	647	651		ITIF/4NU3	22,3676	908	-	-	-		UNZ2	12,2426	116	1	117	
IRS2	E4,1530	37	3	37	883 =		ITIF/4NU	22,3562	905	1	880	=		UPAOFTP1	26,2522	328	1	322	
IRSLIMN2	17,2510	530	-	-	-		ITIF/4IMP	E4,1454	36	10	36	896 =		UPDATI	05,2322	256	1	256	

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SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F	SYMBOL H	DEFINITION	REFERENCES F
UPDATINT	07,2475 774	1 324	UPVERB34	26,2403 327	4 321 324	V01N10X	23,3347 449	1 445
UPDATKIL	31,2145 805	1 803	UPVERB	E4,1721 41	5 321 336	V01N25K	06,3365 376	1 375
UPDATNN	05,2275 255	2 288	URCO	E4,1552 38	3 916 917 =	V01N30D	14,3672 409	- - -
UPDATRET	0107 19	3 255 256 =	URGAXADR	21,3566 631	1 631	V01N30E	14,3674 409	2 383
UPDATVB	05,2315 256	9 247 805	URGENCYQ	E6,1502 51	25 537 631	V04N01K	06,3015 368	1 367
UPDNLIST	15,2236 335	1 213 =	URGENCYR	E6,1504 51	25 538 631	V04N30D	14,3666 409	1 404
UPDOAGN	26,2274 324	2 324	URGFUDG1	17,3142 539	1 539	V05N30E	14,3675 409	1 391
UPDT	1203 28	5 325 811	URGFUDGE	17,3127 539	1 538	V05N30X	23,3350 449	1 448
UPDTCALL	34,3661 670	1 670	URGLIMIT	0066 51	10 539 631 =	V06N03E	14,3676 409	1 407
UPE4	26,2315 327	1 321	URGLIMS	17,3126 539	1 538	V06N20X	23,3351 449	1 446
UPEND64	26,2301 325	1 323	URGLM1	E6,1476 51	1 539 =	V06N40X	23,3352 449	1 446
UPEND67	26,2311 325	1 323	URGLM2	E6,1477 51	1 538 =	V06N66E	14,3677 409	1 402
UPEND70	26,2315 325	1 323	URGLMDWN	16,2250 491	1 489	V06N66X	23,3353 449	1 443
UPEND71	26,2323 325	1 323	URGLMS	E6,1476 51	5 51 489	V0FS	22,3626 907	- - -
UPEND72	26,2331 325	1 323	URGLMUP	16,2252 491	1 489	V0VEC	E4,1723 33	2 916 944 =
UPEND73	26,2341 325	1 323	URGLOOP	17,2733 536	1 538	V0XS	22,3577 906	1 905
UPEND75	26,2345 325	1 323	URGMULT	17,3043 537	1 537	V16N20S	24,3645 434	1 415
UPEND76	26,2155 323	- - -	URGPLANE	17,3154 539	2 539 631	V16N40S	24,3646 434	1 417
UPERROR	31,2356 812	18 809 812	URGRAI1	20,3576 622	- - -	V1STO2S	24,3646 434	1 417
UPGET	1205 28	2 325 812	URGRAI2	20,3613 622	1 622	V21N02K	15,3526 361	5 347 841
UPHERE	26,2070 322	1 322	URGRAI3	20,3640 623	- - -	V21N30E	06,3013 368	1 367
UPIN	26,2051 321	4 321 322	URGRAI4	20,3663 623	1 623	V21N30K	24,3635 434	1 418
UPINDEX	1204 28	14 325 810	URGRAIQ	E6,1725 56	7 56 624	V21N43E	06,3014 368	1 367
UPLMPIN	5066 799	- - -	URGRAIR	E6,1726 56	6 478 539 =	V24N30E	13,3467 167	1 160
UPM	16,3602 515	- - -	URGRELT	21,3545 631	2 631	V24N42E	14,3700 409	1 380
UPNO33	26,2030 321	2 321	URGSCALE	17,3073 538	1 538	V25N22E	13,3470 167	1 161
UPOK	13,3543 229	- - -	URGSCALQ	17,3120 539	1 538	V25N30E	14,3701 409	1 394
UPOLDMOD	E4,1716 41	4 321 327	URGSCALR	17,3064 538	1 539	V4FS	22,3664 908	- - -
UPPART2	26,2000 321	1 320	USEIT	32,2344 916	1 916	V33N00X	23,3354 449	1 446
UPPHASE	1202 28	5 325 810	USEMAX	21,3370 603	1 603	V43K	11,2632 216	1 216
UPQUIT	26,2471 327	2 325 327	USEMAXDT	07,2201 767	1 767	V47K	06,3016 368	1 367
UPQUITRM	26,2464 327	5 70 327	USEPRET	5307 951	- - -	V50K	06,3366 376	1 375
UPRANGE	26,2473 327	2 321 322	USEQRJTS	7762 474	9 215 858 =	V	E4,1466 36	6 36 895 =
UPRAUS	26,2503 327	2 327	USPRCADR	5317 951	5 890 902	VAC1	0431 24	- - -
UPRETURN	26,2132 322	3 322 324	USUALXIT	21,3712 634	1 595	VAC1ADRC	01,2562 99	1 97
UPRPT1	13,3526 229	- - -	UVEDOT1	17,3406 545	2 545	VAC1USE	0430 24	4 971051
UPRPTBB	4057 61	1 60 =	UVEDOT	17,3405 545	1 545	VAC2	0505 24	- - -
UPRUPT	13,3514 229	1 60	UVJOB	20,3705 625	- - -	VAC2USE	0504 24	3 971051
UPSTORE	26,2107 322	1 322	UVNEXT	20,3703 624	2 621 623	VAC3	0561 24	- - -
UPTEMP1	E4,1720 41	3 322 326	UVXFORM	17,3447 545	1 545	VAC3USE	0560 24	3 971051
UPTEMP	E4,1717 41	3 321 327	UXFORM	17,3445 545	4 541 543	VAC4	0635 24	- - -
UPTEST	13,3606 230	2 229	UZERO	21,3472 630	1 629	VAC4USE	0634 24	3 971051
UPTMFAST	12,2746 128	1 131	UZEROR	21,3543 631	1 630	VAC5	0711 24	1 76

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U UNDEFINED
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J FAILED LEFTOVER WORD
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SYMBOL H	DEFINITION	REFERENCES F
VAC5USE	0710 24	3 971051
VACFOUND	01,3100 1051	51051
VACSTOR	13,3324 164	1 164
VAD	1025 977	1 962
VALMIS	24,2230 414	1 463
VARADAR	10,3333 199	1 198
VARDELAY	5704 1064	5 115 800
VAVEGON	E4,1522 34	1 740 =
VBUBN66	24,3643 434	2 422 433
VB21N30E	13,3472 167	1 166
VB50	13,3473 167	1 166
VB51	13,3415 166	1 160
VB53	13,3471 167	1 160
VBCOARK	11,2073 201	1 200
VBFANDIR	05,2133 252	1 252
VBPROC	04,3326 284	2 253 284
VBRELDSP	04,3336 284	1 240
VBRQEXEC	05,3314 283	1 252
VBRQWAIT	05,3340 284	1 252
VBSP1LD	05,2673 268	2 266
VBSP2LD	05,2674 268	2 266
VBSP3LD	05,2675 268	1 266
VBTERM	04,3333 284	3 253 805
VBTSTLTS	05,3414 310	1 253
VBUF	0112 19	54 191024
VBZERO	11,2070 201	1 200
VCONUM	E7,1605 48	1 911
VCV	E4,1436 34	3 777 792 =
VD1	4565 303	7 98 961
VDEF	00,3212 1027	1 964
VDS	22,3577 905	2 884 885 =
VDUM	0016 37	5 894 903 =
VDVECT	E4,1723 41	6 33 737
VE	E4,1424 38	4 917 924 =
VECMODE	15,3516 361	2 363 679
VECOPANG	34,2760 659	2 659
VECPOINT	34,2001 645	4 703 755
VECTAB	E4,1510 34	4 784 796 =
VELCHK	10,2750 189	1 189
VELSC	35,3322 470	1 455
VERB	04,2243 243	1 240
VERBFAN	05,2116 252	7 251 254
VERBREG	0272 22	18 98 277
VERTAB	05,2136 252	1 252
VERTDRFT	24,2114 413	- - -
VEXDEX	E5,1544 42	5 845 846 =
VEXFINDA	30,3247 845	- - -
VEXFINDD	30,3256 845	1 845
VEXFINDR	30,3235 845	- - -
VEXLOOP	30,3263 845	1 845
VEXNUM	E5,1547 42	3 846 =
VEXSTEP	30,3416 848	1 846 =
VFACT	36,3667 945	2 944 945
VGCNTR	E5,1522 48	- - - =
VGVECT	E4,1731 41	5 335 917
VIGNTION	E4,1406 34	- - - =
VINJECT	E7,1437 47	1 701
VISNORMG	16,2240 491	2 489 494
VIZPHASE	7753 474	- - - =
VL	E4,1414 36	5 36 882 =
VLAUN	E5,1644 46	7 46 456 =
VLAUNS	E5,1616 46	3 46 455 =
VLOAD	6563 970	1 962
VLOADCOD	7745 998	1 969 =
VLOAD*	6153 998	1 969 =
VMESSAGE	11,2724 219	1 217
VN1	1056 26	1 843
VN	1016 26	19 337 914
VNCON	37,3527 1097	11097
VNLDRCOD	11,2255 207	1 207
VNLODCOD	11,2252 204	2 204 216
VNLODDT	11,2325 209	1 209
VNLODGYR	11,2232 206	2 206 208
VPATCHER	30,2436 828	4 700 911
VPAILOOP	30,2445 828	1 828
VPDVL	6651 972	- - -
VPROJ	7504 991	1 962
VR	E5,1513 48	- - - =
VRECT	E4,1406 34	6 774 792 =
VRIGHT2	00,2242 1006	11006
VROTATEX	7477 990	31002 1023
VROUND	7412 982	6 990 991
V/SC1	7664 995	1 995
V/SC2	00,2630 1018	1 995
V/SC	7656 995	1 962
V/SCDV	00,2727 1020	31019
VS	E4,1516 37	16 37 885 =
VSHR2	00,2060 1000	11000
VSHRRND	00,2073 1000	41002 1036
VSQ	00,3226 1027	1 964
VSQSUB	00,3301 1028	31022 1027
VSSL	00,2145 1003	31002 1008
VSSR	00,2127 1002	11006
VSTORE	6512 968	- - -
VSU	7053 978	1 962
VTAILOFF	E7,1573 48	1 735
VTEMP	E4,1516 37	2 895 =
VTO	E4,1456 38	3 701 917 =
VTO-APS	E7,1575 48	1 911
VTO-DPS	E7,1571 48	1 701
VV/SC	7661 995	- - -
VVXSC	7463 990	- - -
VXFORM	17,3437 545	4 541 542
VXM	7416 988	1 962
VXM/MXV	7421 989	1 988
VXSC	7460 990	1 962
VXSTEP1	30,3422 848	1 848
VXSTEP2	30,3426 848	- - -
VXSTEP3	30,3432 848	- - -
VXSTEP4	30,3436 848	- - -
VXV	7540 992	1 962
W0	E6,1550 53	4 53 578
W1	E6,1551 53	3 53 578 =
W2	E6,1552 53	3 576 579 =
W	E4,1630 40	4 793 794 =
WAIT2	01,3427 1066	21063 1064
WAIT	37,2760 1088	11089
WAITADR	0063 14	31063 1067 =
WAITBANK	0062 14	21064 1066 =
WAITBB	5700 1064	21063 1072
WAITER	14,3673 409	3 404 406
WAITEXIT	0061 14	31063 1064 =
WAITFIVE	24,2546 419	1 419
WAITLIST	5663 1063	130 63 1099
WAITLOOP	24,3214 427	4 413 419
WAITLP1	24,3217 427	2 427
WAITLP2	24,3236 427	4 413 419
WAITLP3	24,3242 427	1 427

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SYMBOL H	DEFINITION		REFERENCES	F	SYMBOL H	DEFINITION		REFERENCES	F	SYMBOL H	DEFINITION		REFERENCES	F
WAITIEMP	0064	14	31070	=	WILPCADR	24,3241	427	2 427		YCOM	E6,1433	50	- - -	
WAKEIEST	01,3276	1056	11056		WILST2	01,3564	1070	810681069		YCONS	E4,1464	38	2 919 920	=
WANDCHK	37,3037	1089	- - -		WILST4	01,3453	1067	11070		YDC	E5,1430	44	6 341 426	=
WANG1	E5,1572	46	5 412 458	=	WILST5	01,3503	1068	11066		YDOT	E4,1466	38	4 701 917	=
WANGO	E5,1570	46	4 412 458	=	WILTCADR	06,2004	63	3 72 75		YDOTD	E4,1442	38	3 915 917	=
WANGT	E5,1574	46	2 46 458	=	WVECTOR	21,2412	582	2 576		YISZ	15,3143	352	1 352	
WARESCAL	21,3060	596	1 596							YMKRUPT	13,3311	164	1 163	
WARMFILT	21,3145	635	1 594		X1	0046	13	27 3641039	=	YNB	E5,1430	44	2 346 397	=
WASFILT	30,2060	819	1 819		X2	0047	13	6 785 967	=	YREG	0275	22	- - -	
WATERATE	20,3167	588	1 588		XACTO	11,2060	201	2 201 207		YREGLP	0300	22	- - -	
WATEROFF	27,2335	682	- - -		XACTOQ	11,2065	201	2 201		YSM	E5,1406	44	31 346 433	=
WCALC	34,3441	666	1 666		XACT1	11,2044	201	- - -		YUNIT	15,3100	351	2 350 397	
WCENTRAL	0063	52	4 595 597	=	XACTALM	11,2053	201	4 200 327		YV	E4,1613	35	9 791 795	=
WCHANGE	20,2162	478	1 611		XAD2	01,2665	1039	21039		YZJBUF	E4,1402	43	4 370	=
WCHANGER	20,3435	611	1 490		XAD	01,2662	1039	1 963		YZJETMSK	06,3132	371	1 370	
WDAGAIN	05,3230	279	2 280		XCHX	01,2654	1039	1 963		YZJETS	E4,1450	43	1 370	=
WDCNT	0127	20	5 278 280	=	XCTALMKM	26,2304	327	1 322						
WDRET	0105	19	6 278 280	=	XDC	E5,1422	44	16 44 426		Z3DOT	E6,1571	53	3 580 599	
WEARTH	27,2345	682	2 678		XEEDLLMT	36,3575	943	2 943		Z	0005	12	35 77 912	=
WFORP	E6,1640	54	8 54 609		XEEDULMT	36,3570	943	2 942		ZACCDOT	26,3117	615	1 615	
WFORPQRK	10,2242	491	1 489	=	XJBUF	E4,1401	43	4 370	=	ZAXIS	E4,1476	38	4 914 920	=
WFORQR	E6,1641	54	7 478 609	=	XJETMASK	06,3142	371	1 370		ZDATA2	12,2165	109	1 111	
WHERETO	30,3377	854	1 853		XJETS	E4,1440	43	1 370	=	ZDC	E5,1436	44	4 341 426	=
WHIMPER	6012	315	1 315		XKEP	E4,1450	34	13 778 792	=	ZDOT	E4,1404	38	4 701 917	=
WIDEDB	6111	831	1 475		XMKRUPT	13,3305	164	1 163		ZDOTD	E4,1444	38	4 701 917	=
WKSEARCH	4714	308	2 308 309		XNB	E5,1422	44	6 346 397	=	ZERO	7767	997	304 721099	
WLARGE	21,3071	596	1 596		XREG	0274	22	3 261 269		ZEROANS	00,3360	1029	21029	
WMATFLAG	0000	15	4 770 794	=	XREGLP	0277	22	3 242 269		ZEROCOEF	20,3376	609	1 607	
WORCHK	37,3023	1089	- - -		XROT	34,2060	646	1 646		ZERODATA	12,2277	111	1 109	
WPLAII	E5,1714	46	2 458 459	=	XSM	E5,1400	44	70 44 467		ZERODP	15,3104	351	6 340 400	
WPLATO	E5,1620	46	3 457 459	=	XSMADR	24,3667	434	1 429		ZEROERAS	14,3636	408	1 211	
WPOINTER	E6,1547	53	5 575 580		XSMADRX	14,3721	409	1 387		ZEROFIVE	16,2521	496	1 496	
WRCHN12	21,3243	599	5 495 635		XSTORE	01,2630	1038	31038		ZEROICDU	4314	137	2 116 140	
WRDRET	0105	19	- - -	=	XSU	01,2673	1039	1 963		ZEROING1	24,3247	427	1 427	
WRITECHK	37,3004	1089	- - -		XTRANS	17,2413	527	12 524 549		ZEROING	24,3245	427	4 387 452	
WRITEJTS	6041	486	1 484		XTRANSDN	33,2615	706	1 698		ZEROLOOP	07,3522	792	1 792	
WRITEP	6043	486	2 502 503		XTRDUMST	22,3471	903	1 897		ZEROLP1	14,3657	408	1 408	
WRITEPOL	16,2724	502	2 501		XTRIGN1	22,3255	897	3 894 895		ZEROLP	14,3643	408	2 408	
WRITEQR	6046	486	5 486 551		XTRIPIP	22,3343	899	2 875 895		ZEROMAIN	23,3161	445	2 437 447	
WSFTEST	21,3032	595	1 596		XUNIT	15,3102	351	2 350 397		ZEROMODE	23,3151	445	4 437 448	
WTABORT	01,3556	1069	11067		XYMARK	0314	23	8 159 296		ZERONDX	E5,1777	46	6 387 452	=
WTGTSMPL	35,2741	464	1 464							ZERONEG	22,3723	909	- - -	
WTLISTNT	35,2727	464	2 68 464		Y3DOT	E6,1567	53	5 576 598		ZEROPOS	22,3721	909	4 875 889	

KEY: SYMBOLS DEFINED BY EQUALS ARE FLAGGED =. OTHERS ARE NORMALLY DEFINED EXCEPT THOSE FLAGGED:

U UNDEFINED E FAILED LEFTOVER ERASE M MULTIPLY DEFINED I WRONG MEMORY TYPE MM MULTIPLE ERRORS
N NEARLY DEFINED BY = J FAILED LEFTOVER WORD O OVERSIZE- OR ILL-DEFINED C CONFLICT IN MEMORY X MISC. TROUBLE

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SYMBOL H	DEFINITION		REFERENCES F				SYMBOL H	DEFINITION		REFERENCES F				SYMBOL H	DEFINITION		REFERENCES F			
ZEROTEST	21,3365	603	-	-	-		ZOOM	36,3016	931	1	932			ZV	E4,1621	35	5	791	795	=
ZEROURG	17,3036	537	2	537			ZPRIME	0026	44	7	340	341	=							
ZEROVEC	07,2225	768	1	766			ZREG	0276	22	1	251			(1-K)	E6,1642	54	9	54	609	
ZNB	E5,1436	44	4	346	397	=	ZREGLP	0301	22	-	-	-		(1-K)/8	E6,1643	54	4	493	607	=
ZONE4	16,3342	509	1	507			ZRUPT	0015	12	41	0881089		=	(1-K)S	20,3433	610	1	478		
ZONE5	16,3212	507	-	-	-		ZSM	E5,1414	44	27	347	433	=	(1-K),QR	17,2571	531	-	-	-	
ZONE8	16,3211	507	-	-	-		ZSMAZ	E3,1751	33	2	679			(1-KQ)/8	17,2572	531	-	-	-	
ZONES6,7	16,3220	507	1	507			ZUNIT	15,3076	351	2	350	397		(2/3)	21,3306	600	-	-	-	

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SUMMARY OF SYMBOL TABLE LISTING

967 DEFINED BY EQUALS

4305 NORMALLY DEFINED

TOTAL: 5272

H=1800 CHARACTER SEQUENCE (360 LACKS ≠½¤¢): 0123456789'=: >6 +ABCDEFGH¡.)%■? -JKLMNOPQR#$*"≠½ </STUVWXYZ@,(¬¤¢

ERASABLE & EQUIVALENCE CROSS-REFERENCE TABLE, SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

0000	12	A	0011	59	DSALMOUT	0033	334	NDP1	0056	13	LEMONM	0065	52	DEL
0000	878	BRIGN1	0011	12	LRUPI	0033	334	NDP2	0057	13	OUTLINK	0065	14	ITEMP5
0000	15	WMAIFLAG	0011	15	RRNBSW	0034	12	CDUZ	0060	13	ALTM	0065	14	NEWLUC
0001	878	BRLING	0012	59	CHAN12	0034	59	DNTM1	0061	57	AXISCNTR	0065	57	REL
0001	876	BRTIFNO	0012	15	LOKONSW	0034	15	GRRFLAG	0061	53	CDUDOT	0065	83	TEMPSW
0001	15	JSWITCH	0012	12	QRUPI	0035	59	DNTM2	0061	14	EXECTEM1	0065	57	THISPOLY
0001	12	L	0013	59	CHAN13	0035	12	OPTY	0061	57	.1-.05K	0066	57	1/NETACC
0002	167	BASVAC	0013	12	SAMPTIME	0036	12	OPTX	0061	14	ITEMP1	0066	57	1/NJETAC
0002	878	BRIGN2	0014	434	I4C	0037	12	PIPAX	0061	57	K	0066	599	CHNL12
0002	799	LMPGROUP	0014	59	CHAN14	0040	37	ADUM	0061	52	KCENTRAL	0066	57	CTR
0002	15	MIDFLAG	0014	332	NSNAP	0040	12	PIPAY	0061	57	NETACNDX	0066	14	ITEMP6
0002	876	PARL	0015	59	MNKEYIN	0040	44	STARM	0061	52	OMEGA.K	0066	52	GRCNTR
0002	12	Q	0015	12	ZRUPI	0041	12	PIPAZ	0061	603	GRNDXER	0066	599	GRERAS
0003	878	BRXMID	0016	12	BANKRUPI	0042	12	BMAGX	0061	83	TEMPG	0066	83	TEMPSW2
0003	12	EBANK	0016	59	NAVKEYIN	0042	13	LVSQUARE	0061	14	WAITEXIT	0066	51	URGLIMIT
0003	59	HISCALAR	0016	37	VDUM	0042	50	Q-RHCCTR	0062	57	COEFFA	0067	14	NEWJOB
0003	15	MOONFLAG	0017	12	BRUPI	0042	12	RHCP	0062	51	DELQ	0070	52	K2THETA
0003	876	IBRL	0020	12	CYR	0043	12	BMAGY	0062	50	DELTAP	0070	14	RCSMONT1
0004	12	FBANK	0020	44	COSTH	0043	50	P-RHCCTR	0062	14	EXECTEM2	0070	14	RUPTREG1
0004	59	LOSCALAR	0021	12	SR	0043	12	RHCY	0062	14	ITEMP2	0070	83	TEMPRR
0004	876	MODZDPS	0022	12	CYL	0044	12	BMAGZ	0062	57	.5-.5COF	0070	57	TRANONLY
0004	15	NBSMBIT	0022	44	SINTH	0044	13	LV	0062	52	K2CNTRAL	0071	57	ANYTRANS
0005	15	OUARUPIN	0023	12	EDOP	0044	12	RHCR	0062	603	NZACCDOT	0071	52	ETHETA
0005	876	TIF/4CR	0024	37	JDUM	0044	50	R-RHCCTR	0062	57	TEMPERR	0071	14	RCSMONT2
0005	12	Z	0024	44	THETA	0045	12	INLINK	0062	83	TEMPP	0071	14	RUPTREG2
0006	83	BB	0024	12	TIME2	0046	12	RNRAD	0062	57	TJETADR	0071	83	TEMPG2
0006	12	BBANK	0025	12	TIME1	0046	13	XI	0062	14	WAITBANK	0072	52	A2CNTRAL
0006	876	BRXEND	0026	33	MININDEP	0047	12	GYROCMD	0063	53	CDU2DOT	0072	53	CDU
0006	37	PDUM	0026	44	PDA	0047	12	GYROCTR	0063	14	ITEMP3	0072	14	RCSMONT3
0007	329	DMYADRES	0026	12	TIME3	0047	13	X2	0063	14	NEWPRIO	0072	14	RUPTREG3
0007	329	DMYERADR	0026	44	ZPRIME	0050	12	CDUXCMD	0063	57	POLRELOC	0072	52	SF1
0007	329	ERASZERO	0027	12	TIME4	0050	13	S1	0063	83	TEMPNM	0072	83	TEMPP2
0007	15	IMUSE	0030	12	TIME5	0051	12	CDUYCMD	0063	14	WAITADR	0072	57	TRANSNOW
0007	329	SPARE	0031	12	TIME6	0051	13	S2	0063	52	WCENTRAL	0073	14	DSKUPTEM
0007	59	SUPERBNK	0032	12	CDUX	0052	13	CDUZCMD	0064	52	ACENTRAL	0073	14	KEYTEMP1
0007	329	UNKNOWN	0032	37	GDUM	0052	13	OPREI	0064	14	ITEMP4	0073	167	MKDEX
0010	12	ARUPI	0032	33	MAXINDEP	0053	13	OPTYCMD	0064	14	LOCCTR	0073	14	RCSMONT4
0010	59	OUTO	0032	15	SIVBGONE	0054	13	OPTXCMD	0064	57	LOOPCTR	0073	14	RUPTREG4
0010	37	RDUM	0033	59	CHAN33	0055	13	EMSD	0064	83	TEMPBB	0073	52	SF2
0010	15	RRUSE	0033	12	CDUY	0055	13	IMRUSI	0064	14	WAITEMP	0073	83	TEMPBBCN

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0073	57	TRANSAVE	0110	19	FIXLOC	0130	20	POLYCNT	0146	57	TABPLACE	0345	22	DSPCNT
0074	15	CONVSW	0111	19	OVFIND	0130	20	PWRCNT	0147	57	TEMPAOS	0346	23	T4LOC
0074	15	STATE	0112	19	DECTEM	0131	20	DERPTR	0147	76	TEMPSWCH	0347	23	DSRUPTSW
0075	15	DONESW	0112	19	DISTEM	0131	20	DSREL	0150	57	TEMPACC	0350	23	DIDFLG
0075	15	FLAGWRD1	0112	19	NOUNTEM	0131	20	POLYRET	0151	57	TEMPNET	0351	23	ALT
0076	15	FLAGWRD2	0112	19	SGNON	0131	20	TEM1	0152	57	ABVLAOSW	0353	23	ALTRATE
0076	15	ITERSW	0112	19	VBUF	0132	20	DERCUF-8	0153	58	ABVLAOSR	0354	23	FINALT
0077	15	DAPBOOLS	0113	19	NVTEMP	0132	20	DSMAG	0153	21	MODE	0356	23	LGYRO
0077	15	GUESSW	0113	19	SFTEMP1	0132	20	IDADDTEM	0154	21	LOC	0357	23	FORVEL
0100	15	FLAGWRD4	0113	19	SGNOFF	0132	20	TEM2	0155	21	BANKSET	0360	23	LATVEL
0100	15	PIESW	0114	19	CODE	0133	20	COUNT	0156	21	PUSHLOC	0361	23	LASTXCMD
0101	15	ESCPSW	0114	19	DXCRIT	0133	20	DERCUF-7	0157	21	PRIORITY	0362	23	LASTXCMD
0101	15	LMPJFAIL	0114	19	SFTEMP2	0133	20	TEM3	0270	22	DSPCOUNT	0363	23	ALTSAVE
0101	15	MOONSW	0115	19	DXCRIT+1	0134	21	DERCUF-6	0271	22	DECBRNCH	0365	23	IMODES30
0101	15	SMANGLSW	0115	19	MIXTEMP	0134	21	FREEREI	0272	22	VERBREG	0366	23	IMODES33
0102	15	BAKTO4	0115	19	SIGNRET	0134	21	LSTPTR	0273	22	NOUNREG	0367	23	IMUCADR
0102	15	CH5MASK	0116	19	ROOTPS	0134	21	RELRET	0274	22	XREG	0367	23	MODECADR
0102	334	LINCR	0117	19	ROOTPS+1	0134	20	TEM4	0275	22	YREG	0370	23	AOTCADR
0103	15	CH6MASK	0120	20	BUF	0135	21	DERCUF-5	0276	22	ZREG	0370	23	OPTCADR
0103	15	DIRECT	0120	20	INDEXLOC	0135	21	NOUNADD	0277	22	XREGLP	0371	23	RADCADR
0104	19	BLANKRET	0120	20	SWWORD	0135	21	TEM5	0300	22	YREGLP	0372	23	ATTCADR
0104	19	DSEXIT	0121	20	SWBIT	0136	21	DERCUF-4	0301	22	ZREGLP	0373	23	MARKSTAT
0104	19	EXITEM	0122	20	RETROOT	0136	21	NNADTEM	0302	22	MODREG	0374	167	DETCODE
0104	19	INTBIS+	0123	20	BUF2	0137	21	DERCUF-3	0303	22	DSPLOCK	0374	23	XYMARK
0104	15	PASS	0125	20	DMPNTEMP	0137	21	NNTYPTEM	0304	22	REGRET	0375	23	DB
0105	19	Z1/Z2REG	0125	20	MPTEMP	0140	21	DERCUF-2	0305	22	LOADSTAT	0376	23	/TEMP1/
0105	19	DECRET	0126	20	DOTINC	0140	21	IDADITEM	0306	22	CLPASS	0377	23	SMARIFLG
0105	15	HC	0126	20	DVSIGN	0141	21	DERCUF-1	0307	22	NOUT	0400	23	THETAD
0105	19	INTBIIIS	0126	250	ENTEXIT	0141	21	IDAD2TEM	0310	22	NOUNCADR	0403	26	DELV
0105	19	WDRET	0126	20	ENTRET	0142	21	DERCUFN	0311	22	MONSAVE	0403	23	DELVX
0105	19	WRDRET	0126	20	ESCAPE	0142	21	IDAD3TEM	0312	22	MONSAVE1	0405	46	DELVY
0106	19	ADDRWD	0127	20	DOTRET	0143	21	DERCUF+1	0313	22	DSPTAB	0407	46	DELVZ
0106	15	INTEGRSW	0127	20	DVNORMCT	0143	21	ROTMXTEM	0327	22	CADRSTOR	0411	23	UNLSTADR
0107	19	CHAN	0127	20	ESCAPE2	0144	57	JOBAXES	0330	22	GRABLOCK	0412	24	RADMODES
0107	19	DECOUNT	0127	20	INREL	0144	42	LEMMASS1	0331	22	NVQTEM	0413	24	SAMPLIM
0107	19	ERCNT	0127	20	WDCNT	0144	21	MPAC	0332	22	NVBNKTEM	0414	24	RRTARGET
0107	15	ENGOFFSW	0130	20	DSPMMTEM	0144	76	TEMPPHS	0333	22	DSPLIST	0414	24	SAMPLSUM
0107	19	POLISH	0130	20	MATINC	0145	57	NJPLACE	0336	22	EXTVBACT	0414	24	SAMPSUM
0107	19	PWRPTR	0130	20	MAXDVSW	0145	76	TEMP26	0337	22	DSPTEM1	0416	24	OPTYHOLD
0107	19	UPDATRET	0130	20	MIXBR	0146	76	POINTER	0342	22	DSPTEM2	0420	24	TIMEHOLD

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0422	24	MODEA	1032	26	UNITR	1131	27	ROOTRET	1232	29	NUV	1373	30	SKEEP3
0422	24	TANG	1040	26	UNITW	1131	27	SQ	1240	29	REFRCV	1374	30	SKEEP4
0424	24	MODEB	1046	26	RMAG	1132	27	SQRARG	1246	29	REFVCV	1375	30	SKEEP5
0424	24	NSAMP	1050	26	RN1	1133	27	LMPCMD	1254	29	REFTC	1376	30	SKEEP6
0426	24	DESRET	1056	26	VN1	1143	27	LMPIN	1254	29	REFTCV	1377	30	SKEEP7
0426	24	OLDATAGD	1064	26	GDT1/2	1144	28	LMPOUT	1256	29	TE	E3,1400	30	LST1
0427	24	DESCOUNT	1072	26	AVGEXIT	1145	28	LMPOUTT	1260	29	REFXKEP	E3,1410	30	LST2
0430	24	VAC1USE	1074	26	AVGOUTF	1146	28	LMPRET	1262	29	REFSMMAT	E3,1432	30	LONGBASE
0431	24	VAC1	1074	26	DVMNEXIT	1147	28	LMPBBANK	1304	29	PIPRETRN	E3,1434	30	LONGEXIT
0504	24	VAC2USE	1076	26	KEYTEMP2	1150	28	SAVDT	1304	40	RETSAVE	E3,1436	30	PBIASX
0505	24	VAC2	1076	26	RUPTAGN	1151	28	LONGCADR	1304	29	TDECTEMP	E3,1436	30	PIPABIAS
0560	24	VAC3USE	1077	27	-PHASE1	1153	28	LONGTIME	1306	29	PIPTIME	E3,1437	30	PIPASCF
0561	24	VAC3	1100	27	PHASE1	1155	28	CMEMORY	1310	29	DVSELECT	E3,1437	30	PIPASCFX
0634	24	VAC4USE	1101	27	-PHASE2	1155	28	TEMX	1311	29	TEVENT	E3,1440	30	PBIASY
0635	24	VAC4	1102	799	LMPPHASE	1156	28	TEMY	1320	29	MASS	E3,1441	30	PIPASCFY
0710	24	VAC5USE	1102	27	PHASE2	1157	28	TEMZ	1322	29	/ACF/	E3,1442	30	PBIASZ
0711	24	VAC5	1103	27	-PHASE3	1160	28	TEMXY	1323	29	PCNTR	E3,1443	30	PIPASCFZ
0735	76	GOLOC	1104	27	PHASE3	1161	28	PIPAGE	1324	29	/AF/	E3,1444	30	GBIASX
0764	24	PHASENUM	1105	27	-PHASE4	1162	28	JETRESET	1326	29	STATIME	E3,1444	30	NBDX
0765	24	L/PIPADT	1106	27	PHASE4	1163	28	THISCH32	1330	29	CDUTEMP	E3,1445	30	NBDY
0765	24	OLDBIT	1107	27	-PHASE5	1164	28	MTIMER4	1336	29	SLOSHCTR	E3,1446	30	NBDZ
0766	24	CDUXD	1110	27	PHASE5	1165	28	MTIMER3	1337	29	STARIDVC	E3,1447	30	ADIAX
0767	24	CDUYD	1111	27	-PHASE6	1166	28	MTIMER2	1340	29	STOPDVC	E3,1450	30	ADIAY
0770	24	CDUZD	1112	27	PHASE6	1167	28	MTIMER1	1341	29	SETDVCNT	E3,1451	30	ADIAZ
0771	24	DELCDUX	1113	27	TBASE1	1170	28	MPHASE4	1342	29	RSDTTEMP	E3,1452	31	ADSRAX
0771	32	DELDCDU	1114	27	PHSPRDT1	1171	28	MPHASE3	1343	29	TPREETER	E3,1453	31	ADSRAY
0772	24	DELCDUY	1115	799	LMPTBASE	1172	28	MPHASE2	1345	29	DAPOFFDT	E3,1454	31	ADSRAZ
0772	32	DELDCDU1	1115	27	TBASE2	1173	28	MPHASE1	1346	29	OLDDVSEL	E3,1455	31	COMMAND
0773	24	DELCDUZ	1116	27	PHSPRDT2	1174	28	MTIMER4T	1353	30	ERESTORE	E3,1455	31	GCOMP
0773	32	DELDCDU2	1117	27	TBASE3	1200	28	MDUETEMP	1353	30	SELFERAS	E3,1460	31	CDUIND
0774	24	OMEGAPD	1120	27	PHSPRDT3	1201	28	STATECTR	1354	30	SELFRET	E3,1463	31	GCOMPSW
0775	24	OMEGAWD	1121	27	TBASE4	1202	28	UPPHASE	1355	30	SMODE	E3,1464	31	RRREI
0776	24	OMEGARD	1122	27	PHSPRDT4	1203	28	UPDT	1356	30	REDOCTR	E3,1465	31	RDES
1000	24	IBADR	1123	27	TBASE5	1204	28	UPINDEX	1357	30	SFAIL	E3,1466	31	RRINDEX
1002	25	IBNEXT	1124	27	PHSPRDT5	1205	28	UPGET	1360	30	FAILREG	E3,1467	31	AOTAZ
1004	25	IBNEXTJ1	1125	27	TBASE6	1207	28	MRETURN	1363	30	ALMCADR	E3,1472	31	AOTEL
1007	25	DELAYCTR	1126	27	PHSPRDT6	1210	28	PMEMORY	1365	30	ERCOUNT	E3,1475	31	AZANG
1010	26	RN	1127	27	RSTRTWRD	1210	28	REFRRECT	1366	30	SCOUNT	E3,1475	31	DESLOTSX
1016	26	VN	1130	27	HALFY	1216	28	REFVRECT	1371	30	SKEEP1	E3,1475	31	DESLOTSY
1024	26	GDT/2	1130	27	TEMK	1224	29	DELTAV	1372	30	SKEEP2	E3,1475	31	ELANG

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E3,1475	31	ROLL	E3,1615	32	C2MP	E3,1747	33	TILT	E4,1414	34	TDELTAV	E4,1460	34	BETAV	
E3,1500	31	LANDMARK	E3,1615	32	K3	E3,1751	33	ZSMAZ	E4,1420	43	NEXTTIME	E4,1460	34	DELVEL	
E3,1506	31	TIMESAV	E3,1615	32	OGF	E3,1753	33	TEPHEM	E4,1422	38	AT	E4,1460	43	JETOFFTM	
E3,1510	31	SCALSAV	E3,1617	32	C1PP	E3,1756	33	AZO	E4,1422	34	NEWNUV	E4,1460	38	KR	
E3,1512	31	TIMAR	E3,1621	32	C1MP	E3,1760	33	P37BLAT	E4,1422	34	TNUV	E4,1460	36	R	
E3,1514	31	TIMEDIFF	E3,1623	32	CUF	E3,1762	33	P37BLONG	E4,1424	38	VE	E4,1464	38	YCONS	
E3,1516	31	PHSNAME1	E3,1631	32	CPHI	E3,1764	33	DELVBUF	E4,1426	38	TBUP	E4,1466	34	UVECTOR	
E3,1517	31	PHSBB1	E3,1632	32	CTHETA	E3,1764	33	GLIFTOFF	E4,1430	39	1/DV1	E4,1466	34	PHIV	
E3,1520	31	PHSNAME2	E3,1633	32	CPSI	E3,1772	33	MPBTO7	E4,1430	38	ATMEAS	E4,1466	36	V	
E3,1521	31	PHSBB2	E3,1634	32	BRATE	E3,1773	33	MPBTO9	E4,1430	34	FOUNDR	E4,1466	38	YDOT	
E3,1522	31	PHSNAME3	E3,1634	32	COFSKEW	E3,1774	33	RSBBQQ	E4,1430	43	JETONTM	E4,1470	43	ENGSTEP	
E3,1523	31	PHSBB3	E3,1634	32	IG	E4,1400	34	AMEMORY	E4,1430	34	RCV	E4,1470	38	LAXIS	
E3,1524	31	PHSNAME4	E3,1642	32	AM	E4,1400	36	E2DP5	E4,1432	39	1/DV2	E4,1471	43	CYLTIMES	
E3,1525	31	PHSBB4	E3,1644	32	CAM	E4,1400	43	FCSCNTR	E4,1433	36	TABLTIF	E4,1474	43	NEXTCYLT	
E3,1526	31	PHSNAME5	E3,1644	32	TM	E4,1400	36	NDX2DP5	E4,1434	39	1/DV3	E4,1474	34	PSIV	
E3,1527	31	PHSBB5	E3,1646	32	RAD	E4,1400	38	PAXIS1	E4,1436	34	FOUNDV	E4,1474	36	VL	
E3,1530	31	PHSNAME6	E3,1650	32	RSQ	E4,1400	34	RIGNITION	E4,1436	38	KR1	E4,1476	38	ZAXIS	
E3,1531	31	PHSBB6	E3,1652	32	RATEINDX	E4,1400	34	RRECT	E4,1436	34	VCV	E4,1477	43	ONTIME	
E3,1532	32	BCDU	E3,1653	32	SPNDX	E4,1401	36	NDXBR	E4,1440	38	RDOTU	E4,1502	34	FV	
E3,1535	32	MIS	E3,1654	32	MYNDX	E4,1401	43	XJBUF	E4,1440	43	XJETS	E4,1502	43	OFFTIME	
E3,1557	32	E1	E3,1655	32	POINTVSM	E4,1402	36	FLPASSU	E4,1442	38	YDOTU	E4,1502	36	RP2	
E3,1557	32	KEL	E3,1663	32	SCAXIS	E4,1402	43	YZJBUF	E4,1444	36	PIPTIMET	E4,1504	36	MAP2	
E3,1557	32	MFI	E3,1671	32	TF	E4,1403	36	COUNTFC	E4,1444	34	TC	E4,1504	38	ZDOT	
E3,1557	32	MFS	E3,1673	32	COGAVAIL	E4,1403	43	JFBUF	E4,1444	38	ZDOTU	E4,1505	43	OFFTIMER	
E3,1565	32	E2	E3,1675	32	SPLOC	E4,1404	36	COUNTFCT	E4,1446	38	RRETURN	E4,1506	37	RC	
E3,1600	33	RESTRICS	E3,1700	32	UNR1	E4,1404	43	FCNTR	E4,1446	34	TET	E4,1506	38	TIME	
E3,1601	32	K1	E3,1706	33	ROVEC	E4,1405	36	AVGXTEMP	E4,1446	36	TPIP	E4,1510	38	GEFF	
E3,1601	32	MFISYM	E3,1714	33	UNNORM	E4,1405	43	THBUF	E4,1450	38	ASCRET	E4,1510	37	RS	
E3,1601	32	NCDU	E3,1722	33	INDEP	E4,1406	43	OFFTMBUF	E4,1450	36	TPIPOLD	E4,1510	37	RTEMP	
E3,1601	32	M21	E3,1724	33	TWEEKIT	E4,1406	38	OAXIS	E4,1450	43	YZJETS	E4,1510	34	TAVEGON	
E3,1601	32	TMFI	E3,1726	33	DEPVAR	E4,1406	36	REINTLZ	E4,1450	34	XKEP	E4,1510	43	TRIMSTEP	
E3,1601	32	TMIS	E3,1730	33	PREVDEP	E4,1406	34	VIGNITION	E4,1451	38	LAMPRIO	E4,1510	34	VECTAB	
E3,1603	32	D21	E3,1732	33	DELDEP	E4,1406	34	VRECT	E4,1452	34	ALPHAV	E4,1511	43	NUMTIMES	
E3,1604	32	NEXTIME	E3,1734	33	DELINDEP	E4,1407	43	JETSTEP	E4,1452	34	DELR	E4,1512	38	PCONS	
E3,1605	32	G21	E3,1736	33	IGRR	E4,1407	36	RETXIGNI	E4,1452	38	TCO	E4,1512	34	TRESUME	
E3,1605	32	TTEMP	E3,1740	33	TLIFTOFF	E4,1410	43	NTIMES	E4,1452	36	TTF/4	E4,1514	34	RAVEGON	
E3,1607	32	C2SUP	E3,1742	33	ABORINDX	E4,1410	36	RETTHRI	E4,1454	38	TREF	E4,1516	37	VS	
E3,1607	32	K2	E3,1742	33	DT-LIFT	E4,1411	36	CLT/2	E4,1454	36	TTF/4TMP	E4,1516	37	VTEMP	
E3,1611	32	C2SUM	E3,1743	33	DT-LETJT	E4,1414	34	NEWDLTAV	E4,1456	36	TULLG	E4,1522	34	VAVEGON	
E3,1613	32	C2PP	E3,1745	33	AZGR	E4,1414	38	SAXIS	E4,1456	38	VTO	E4,1524	37	CRS2	

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E4,1525	43	STEPDLYT	E4,1602	37	ADELLINS	E4,1671	40	UNITVG	E5,1504	44	MGC	E5,1557	42	DAREATMP
E4,1526	37	SRS2	E4,1602	35	DSPRTRN	E4,1677	41	STBUFF	E5,1506	44	AZIMUTH	E5,1561	42	MASSTEMP
E4,1530	38	PRATE	E4,1602	37	GDUMPRES	E4,1715	41	STCOUNT	E5,1506	48	DVTOTAL	E5,1561	45	TEMPTIME
E4,1530	34	RIG-2SEC	E4,1602	35	MIDEXIT	E4,1716	41	UPOLDMOD	E5,1506	48	SAVEBASE	E5,1563	42	MINIMASS
E4,1530	37	IRS2	E4,1603	35	INCORPEX	E4,1717	41	UPTEMP	E5,1510	44	LATITUDE	E5,1563	45	TESTNO
E4,1532	37	ASPRT	E4,1604	35	STEPEXIT	E4,1720	41	UPTEMP1	E5,1511	48	DVCNTR	E5,1564	45	TMARK
E4,1532	37	GDOTMIT	E4,1605	35	DIFEQCNT	E4,1721	41	UPVERB	E5,1512	44	EROPTN	E5,1565	42	ETHROT
E4,1532	38	H1	E4,1605	35	NORMGAM	E4,1722	41	COMPNUMB	E5,1512	48	PIPCTR	E5,1565	42	FOLD
E4,1540	37	ACS	E4,1605	43	THRTSTEP	E4,1723	41	DOWN2DPS	E5,1513	44	ERVECTOR	E5,1566	45	SHAFTA
E4,1540	38	IGO	E4,1606	43	DOTIME5	E4,1723	33	VOVEC	E5,1513	48	VR	E5,1567	42	FCOLD
E4,1541	43	TRIMONT	E4,1606	35	SCALEA	E4,1723	41	VDVEC1	E5,1521	44	GYROD	E5,1567	45	TRUNA
E4,1542	38	IPL	E4,1607	35	SCALEB	E4,1731	41	VGVEC1	E5,1522	48	VGCNTR	E5,1570	45	AINLA
E4,1546	37	AFCS	E4,1610	37	GDOTM1	E4,1737	39	RCOV	E5,1523	48	ERRORSUM	E5,1570	46	BMEMORY
E4,1546	38	RDOT	E4,1610	37	TTFLIN/4	E4,1737	41	RD	E5,1527	44	LENGTHOT	E5,1570	45	CDUTIME1
E4,1550	38	RY	E4,1613	35	YV	E4,1745	41	TTGO	E5,1530	44	LOSVEC	E5,1570	42	FC
E4,1552	38	URCO	E4,1614	43	DELAY	E4,1751	41	E4LOAD	E5,1531	48	DIFFANG	E5,1570	45	GENPL
E4,1554	37	AFC	E4,1621	35	ZV	E4,1751	41	MPDTOB	E5,1533	48	STREXIT	E5,1570	45	RDSP
E4,1554	34	ALPHAM	E4,1622	43	THRITIME	E4,1752	41	MP9-11DT	E5,1534	48	ABDELV	E5,1570	46	WANGD
E4,1555	43	TRIMOFFT	E4,1627	40	PBODY	E4,1753	41	MP111013	E5,1536	44	NBPOS	E5,1572	45	CDUTIMEF
E4,1556	34	BETAM	E4,1630	40	AVMIDRTN	E4,1754	41	RP	E5,1536	48	SWITCH	E5,1572	42	PIF
E4,1560	34	GIVENT	E4,1630	43	THCOMM1	E4,1756	41	CPI672	E5,1537	48	NEGXDV	E5,1572	46	WANG1
E4,1560	34	IAU	E4,1630	40	W	E4,1764	41	RIVEC	E5,1537	44	NDXCTR	E5,1574	45	CDUDANG
E4,1562	34	DI/2	E4,1632	40	AXISD	E4,1772	41	TINT	E5,1540	44	PIPAND	E5,1574	42	PIPPSET
E4,1562	37	/AFC/	E4,1636	44	THCOMM2	E4,1774	41	RCO	E5,1541	45	PIPINDEX	E5,1574	42	RTNHOLD
E4,1564	34	H	E4,1640	40	AXIS	E4,1776	41	IIGNITION	E5,1542	45	PIPNDX	E5,1574	45	TEMPADD
E4,1564	37	/AFC/OLD	E4,1644	44	30BUF1	E5,1400	44	XSM	E5,1544	42	EVEX	E5,1574	46	TORQNDX
E4,1566	35	ENGOFFDT	E4,1646	40	COSCDU	E5,1406	44	YSM	E5,1544	45	POSITION	E5,1574	46	WANG1
E4,1566	34	IDEC	E4,1650	44	30BUF0	E5,1414	44	ZSM	E5,1544	42	VEXDEX	E5,1575	45	CDUREADF
E4,1566	37	UNAFC/2	E4,1654	44	QUITLOOK	E5,1422	44	XDC	E5,1545	42	PREFORCE	E5,1575	45	TEMP
E4,1570	35	FBRANCH	E4,1654	40	SINCDU	E5,1422	44	XNB	E5,1545	45	QPLAC	E5,1576	45	CDUREAD1
E4,1571	35	MBRANCH	E4,1655	44	CHCNTR	E5,1430	44	YDC	E5,1546	45	QPLACE	E5,1576	46	DRIFTT
E4,1571	43	TRIMIND	E4,1662	40	DT2TEMP	E5,1430	44	YNB	E5,1547	45	QPLACES	E5,1576	42	FWEIGHT
E4,1572	35	GMODE	E4,1662	739	EMP11JOB	E5,1436	44	ZDC	E5,1547	42	VEXNOM	E5,1576	45	NOBITS
E4,1573	35	GREADY	E4,1662	40	MPRETRN	E5,1436	44	ZNB	E5,1550	45	RUN	E5,1577	45	CHAN
E4,1574	37	ADLINS	E4,1662	40	SHJUMP1	E5,1444	44	STARAD	E5,1551	42	DELAREA	E5,1577	45	CDULIMIT
E4,1574	35	MEASW	E4,1663	40	DT11TEMP	E5,1466	44	STAR	E5,1551	45	STOREPL	E5,1600	46	ALX15
E4,1574	37	UNAFC/2D	E4,1663	40	DT2TEMPD	E5,1474	44	SAC	E5,1552	45	SOUTHDR	E5,1600	45	LOS1
E4,1576	35	DELTAU	E4,1663	40	THRUST	E5,1476	44	PAC	E5,1553	42	AREARATE	E5,1601	46	CMPX1
E4,1600	35	MEASMODE	E4,1665	40	TDI	E5,1500	44	OGC	E5,1553	45	TAZELI	E5,1602	46	ALK
E4,1601	35	NVCODE	E4,1667	40	TIGN	E5,1502	44	IGC	E5,1555	42	NEGVEX	E5,1606	45	LOS2

ERASABLE & EQUIVALENCE CROSS-REFERENCE TABLE, SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

E5,1614	45	CALCDIR	E5,1742	46	GEOCOMPS	E6,1424	49	KRATEDIF	E6,1471	50	JTSONNOW	E6,1547	53	WPOINTER	
E5,1615	45	CDUFLAG	E5,1743	46	OLDGT	E6,1425	49	OLDXFORQ	E6,1472	51	JTSATCHG	E6,1550	53	W0	
E5,1616	45	GYTORBIT	E5,1744	46	1SECXT	E6,1426	49	OLDYFORQ	E6,1473	51	ADDT6JTS	E6,1551	53	W1	
E5,1616	46	IMFIAX	E5,1745	46	GTSWTLST	E6,1427	49	OLDZFORQ	E6,1474	51	ADDTLI6	E6,1552	53	W2	
E5,1616	46	VLAUNS	E5,1746	46	ERECTIME	E6,1430	49	OLDZFORQ	E6,1475	51	TOFJTCHG	E6,1553	53	CDUYFIL	
E5,1617	45	OPTNREG	E5,1747	46	GEOMIRX	E6,1431	50	PCOM	E6,1476	51	URGLM1	E6,1555	53	CDUZFIL	
E5,1620	45	SAVE	E5,1771	46	ERCOMP	E6,1432	50	RCOM	E6,1476	51	URGLM5	E6,1557	53	DCDUYFIL	
E5,1620	46	WPLAID	E5,1777	46	ZERONDX	E6,1433	50	YCOM	E6,1477	51	URGLM2	E6,1561	53	DCDUZFIL	
E5,1623	45	SPCONSIT	E6,1400	49	MR12	E6,1434	50	TJETSIGN	E6,1500	51	-2JETLIM	E6,1563	53	D2CDUYFL	
E5,1624	46	INTY	E6,1401	49	M22	E6,1435	50	PRATECOM	E6,1501	51	-RATEDB	E6,1565	53	D2CDUZFL	
E5,1624	46	IMFIAN	E6,1401	49	MR22	E6,1436	50	EDOTGEN	E6,1502	51	URGENCYQ	E6,1567	53	Y3DOT	
E5,1624	45	TIMER	E6,1402	49	MR13	E6,1437	50	KRATEDIF	E6,1504	51	URGENCYR	E6,1570	53	CDU3DOT	
E5,1626	46	ANGZ	E6,1403	49	M32	E6,1440	50	1/2JTSP	E6,1506	51	A+B	E6,1571	53	Z3DOT	
E5,1626	45	DATAPL	E6,1403	49	MR23	E6,1441	50	PPQR	E6,1507	51	A-B	E6,1572	53	PFILTADR	
E5,1630	46	INTZ	E6,1404	49	M11	E6,1442	50	MINRA	E6,1510	51	TERMA	E6,1574	53	PFRFILST	
E5,1632	46	ANGY	E6,1405	49	M21	E6,1443	50	MINRASQ	E6,1511	51	TERMB	E6,1604	53	JETRATE	
E5,1634	46	ANGX	E6,1406	49	M31	E6,1444	50	FCT1	E6,1513	51	INVACCSQ	E6,1605	53	JETRATEQ	
E5,1636	46	DRIFTJ	E6,1407	49	EDOT	E6,1444	50	HDAP	E6,1515	51	DISPLACT	E6,1606	53	JETRATER	
E5,1640	46	DRIFTI	E6,1410	49	EDOT(R)	E6,1445	50	U	E6,1516	51	POLTEST	E6,1607	53	NO.QJETS	
E5,1644	46	FILDELV	E6,1411	49	E	E6,1446	50	DENOM	E6,1517	52	TJSR	E6,1610	53	NO.RJETS	
E5,1644	46	VLAUN	E6,1411	49	EQ	E6,1447	50	RATIO	E6,1520	52	MULTFLAG	E6,1611	53	IP	
E5,1646	46	ACCWD	E6,1411	47	PCDUX	E6,1450	50	L•PVI-CG	E6,1521	52	FUNCTION	E6,1612	53	TQR	
E5,1646	46	INTVEC	E6,1412	49	EDOT(2)	E6,1451	50	TEMPINER	E6,1523	52	NEGUG	E6,1613	53	IJACC	
E5,1654	46	POSNV	E6,1412	49	EDOT(2)Q	E6,1452	50	IXX	E6,1525	52	NEGUR	E6,1614	54	IJACCQ	
E5,1656	46	DPIPAY	E6,1412	47	PCDUY	E6,1453	50	IYY	E6,1526	52	KQ	E6,1615	54	IJACCR	
E5,1662	46	DPIPAZ	E6,1413	49	ER	E6,1454	50	IZZ	E6,1527	52	KQ2	E6,1616	54	IJACCU	
E5,1664	46	ALTIM	E6,1413	47	PCDUZ	E6,1455	50	4JETWRK	E6,1530	52	KRDAP	E6,1617	54	IJACCV	
E5,1665	46	ALTIMS	E6,1414	49	EDOT(2)R	E6,1456	50	JETWRK4	E6,1531	52	KR2	E6,1620	54	INERCTR	
E5,1666	46	ALDK	E6,1415	49	OMEGAP	E6,1457	50	COSMG	E6,1532	52	ACCDOTQ	E6,1621	54	INERCTRX	
E5,1670	45	MASKREG	E6,1416	47	DCDUY	E6,1460	50	FPQRMIN	E6,1533	52	QACCDOT	E6,1622	54	SAVRATEQ	
E5,1672	45	CDUNDX	E6,1416	49	OMEGAQ	E6,1461	50	NJET	E6,1534	52	ACCDOTR	E6,1623	54	SAVRATER	
E5,1673	45	RESULTCT	E6,1417	49	ALPHAQ	E6,1462	50	PRATEDIF	E6,1535	52	RACCDOT	E6,1624	54	SUMRATEQ	
E5,1676	45	COUNTPL	E6,1420	47	DCDUZ	E6,1463	50	LASTPER	E6,1536	52	TIMEOFFQ	E6,1625	54	SUMRATER	
E5,1677	45	CDUANG	E6,1420	49	OMEGAR	E6,1464	50	LASTQER	E6,1537	52	TIMEOFFR	E6,1626	54	OLDWFORQ	
E5,1704	46	DELM	E6,1421	49	ALPHAR	E6,1465	50	LASTRER	E6,1540	53	STORCDUY	E6,1627	54	OLDWFORR	
E5,1714	46	WPLATI	E6,1422	49	EDOTP	E6,1466	50	PERROR	E6,1541	53	STORCDUZ	E6,1630	54	DBMINIMP	
E5,1716	46	GEOSAVED	E6,1422	47	OMEGA	E6,1467	50	QDIFF	E6,1542	53	DT	E6,1631	54	MINIMPDB	
E5,1717	46	PREMIRXC	E6,1423	49	EDOTQ	E6,1467	50	QERROR	E6,1543	53	DAPTIME	E6,1632	54	DBMNMPAX	
E5,1720	46	PRELMIRX	E6,1423	49	QRATEDIF	E6,1470	50	RERROR	E6,1544	53	STEERADR	E6,1633	54	.5ACCMNE	
E5,1720	46	IRANSM1	E6,1424	49	EDOTR	E6,1470	50	RDIFF	E6,1545	53	DPDIFF	E6,1634	54	.5ACCMNQ	

ERASABLE & EQUIVALENCE CROSS-REFERENCE TABLE, SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

E6,1635	54	.5ACCMNR	E6,1702	55	1/NET+2R	E6,1747	56	DRIVELIM	E7,1605	48	VCONOM	5733	572	RCSMONEX
E6,1636	54	.5ACCMNU	E6,1703	55	1/NET+4R	E6,1750	56	DRIVPACU	E7,1613	48	RCOTEMPV	5733	230	TMALM
E6,1637	54	.5ACCMNV	E6,1704	55	1/NET-2R	E6,1752	56	DRIVPACR	E7,1621	48	TAG5	6153	998	VLOAD*
E6,1640	54	WFORP	E6,1705	55	1/NET-4R	E6,1753	56	QGIMIIMR	E7,1623	48	ABDVCONV	6156	1077	S-4
E6,1641	54	WFORQR	E6,1706	55	1/NET+1U	E6,1754	56	RGIMIIMR	E7,1626	48	KT	6306	1077	S+6
E6,1642	54	(1-K)	E6,1706	55	1/NETACS	E6,1755	56	MAXTIME	E7,1776	42	LEMMASS2	6306	997	SIX
E6,1643	54	(1-K)/8	E6,1707	57	1/2JETSU	E6,1756	56	/TEMP2/	4057	61	UPRPTBB	6311	197	BIN3
E6,1644	54	1/NJISQ	E6,1707	55	1/NET+2U	E6,1757	56	/TEMP3/	4260	1061	PRIO24	6311	998	LOW2
E6,1645	54	1/NJISR	E6,1710	55	1/NET-1U	E6,1761	56	/TEMP5/	4322	158	3SECSM	6311	167	OCT3
E6,1646	54	1/NJISU	E6,1711	55	1/NET-2U	E6,1763	56	TMINAPS	4435	170	ENDRMODF	6311	1077	S+3
E6,1647	54	1/NJISV	E6,1712	55	1/NET+1V	E6,1764	56	SIMPCNTR	4530	997	NINE	6311	997	THREE
E6,1650	54	KCOEFCTR	E6,1713	57	1/2JETSV	E6,1765	56	SIMPINIT	4530	409	OCT11	6341	961	FBANKMSK
E6,1651	54	DLCDUIDX	E6,1713	55	1/NET+2V	E6,1766	56	BIGBOX	4563	303	B12-1	7015	290	DATWAIT1
E6,1652	54	PJUMPADR	E6,1714	55	1/NET-1V	E7,1400	47	LDATALST	4564	1077	S8BITS	7017	976	Q+2
E6,1653	54	QJUMPADR	E6,1715	55	1/NET-2V	E7,1401	47	DNIMGOTO	4565	961	OCT23	7020	77	ICQ
E6,1654	54	CH5TEMP	E6,1716	55	SIGNIAG	E7,1402	47	IMINDEX	4570	409	OCT12	7743	751	925PCTHR
E6,1655	54	-.06R/S2	E6,1717	55	1/ACCQ	E7,1403	47	DNCDUCNT	4570	997	TEN	7743	505	SLOPEMP
E6,1656	54	100MSPIQ	E6,1720	55	1/ACCR	E7,1404	47	DNCDUN	5210	998	BIT13-14	7744	997	LIMIT5
E6,1656	55	QR,1S10Q	E6,1721	55	1/AMINQ	E7,1405	47	CDUEMIT	5210	303	CHRPRIO	7745	997	NEGMAX
E6,1657	55	NO.PJETS	E6,1722	55	1/AMINR	E7,1406	47	DNQ	5210	1061	PRIO30	7745	1077	SBIT15
E6,1660	55	AOSQ	E6,1723	56	1/AMINU	E7,1407	47	DNIMBUFF	5234	1061	PRIO12	7745	474	SPSBACUP
E6,1661	55	AOSR	E6,1724	56	1/AMINV	E7,1435	47	RINJECT	5336	76	MINUS2	7745	998	VLOADCOD
E6,1662	55	AOSU	E6,1725	56	URGRATQ	E7,1437	47	VINJECT	5336	1077	S-2	7746	474	AUTOKHLD
E6,1663	55	AOSV	E6,1726	56	URGRATR	E7,1441	47	RTSTDEX	5337	1077	S10BITS	7746	997	HALF
E6,1664	55	AOSQTERM	E6,1727	56	QUOTTEMP	E7,1442	47	RTSTMAX	5340	1077	S-3	7746	1061	PRIO20
E6,1665	55	AOSRTERM	E6,1727	56	SRTEMP	E7,1443	47	RTSTBASE	5342	76	OCT177	7746	997	POS1/2
E6,1666	55	NJ+Q	E6,1730	56	SQRTTEMP	E7,1444	47	RSTKLOC	5352	1061	EBANK3	7746	721	PRIOKM
E6,1667	55	NJ-Q	E6,1731	56	SQRTTEMQ	E7,1444	47	RTSTLOC	5352	466	GEOBND	7746	1077	SBIT14
E6,1670	55	NJ+R	E6,1732	56	AOSCOUNT	E7,1445	47	RSAMPDT	5502	172	-BIT12	7747	1061	PRIO10
E6,1671	55	NJ-R	E6,1733	56	QACDUTMP	E7,1446	47	RFAILCNT	5567	71	INITDSP	7747	997	QUARTER
E6,1672	55	NJ+U	E6,1735	56	RACDUTMP	E7,1447	47	RSTACK	5632	1061	EBANK6	7747	1077	SBIT13
E6,1673	55	NJ-U	E6,1736	56	PASSCTR	E7,1557	47	LAST30	5634	1077	SBNK03	7750	474	MASSGOOD
E6,1674	55	NJ+V	E6,1737	56	SLECTLAW	E7,1562	47	MSGCNT	5640	83	OCT14000	7750	1061	PRIO4
E6,1675	55	NJ-V	E6,1740	56	HOLDCDUY	E7,1563	48	COMPTURK	5641	131	OCT15000	7750	1077	SBIT12
E6,1676	57	1/2JISQ	E6,1741	56	HOLDCDUZ	E7,1571	48	VTO-DPS	5642	131	33RDMSK	7750	909	ISCALE
E6,1676	55	1/NET+2Q	E6,1742	56	STEERAD2	E7,1573	48	VTAILOFF	5655	961	B12T14	7751	997	2K
E6,1677	55	1/NET+4Q	E6,1743	56	COUNTBOX	E7,1575	48	VTO-APS	5661	466	GEOBND1	7751	1061	EBANK4
E6,1700	55	1/NET-2Q	E6,1744	56	TRIMCNTR	E7,1577	48	TGONUM	5717	303	TCTSKOVR	7751	474	GODAPGO
E6,1701	55	1/NET-4Q	E6,1745	56	GTSMNTTR	E7,1601	48	COS27	5723	303	TCNOVAC	7751	1061	PRIO2
E6,1702	57	1/2JISR	E6,1746	56	FORCETRM	E7,1603	48	SIN27	5733	131	CLOCKOK	7751	1077	SBIT11

ERASABLE & EQUIVALENCE CROSS-REFERENCE TABLE, SHOWING DEFINITION, PAGE OF DEFINITION, AND SYMBOL

7752	1061	PRIO1	7760	997	EIGHT	7765	83	OCT7	07,3675	797	3/8	22,2043	876	BURN
7752	474	PULSES	7760	1076	SBIT4	7765	1077	S+7	07,3701	797	DQUARTER	22,3562	905	TTF/4NU
7752	1077	SBIT10	7761	474	DATAGOOD	7766	99	NUMGRPS	07,3701	797	POS1/4	22,3563	905	ADS
7753	1077	SBIT9	7761	997	FOUR	7766	1077	S+5	07,3733	797	2/3	22,3571	905	RDS
7753	474	VIZPHASE	7761	1076	SBIT3	7767	1077	S+ZERO	07,3743	798	MOONVEC	22,3577	905	VDS
7754	474	APSGOING	7761	1077	S+4	7770	1077	S-ZERO	07,3746	798	SUNVEC	22,3605	905	JDS2
7754	158	IMUSEFLG	7762	1076	SBIT2	7771	997	MINUS1	11,2153	207	OPTCOARV	22,3607	905	MADPZ
7754	1077	SBIT8	7762	1077	S+2	7771	997	NEG1	12,2753	130	IMUFAIL	22,3734	909	2DPS2/3
7755	474	DBSELECT	7762	474	TRYGIMBL	7771	1077	S-1	12,2753	130	ICDUFAIL	27,2442	682	SVEXADRS
7755	177	RRUSEFLG	7762	997	TWO	01,3000	1045	SW7	12,3161	135	NORRGMON	30,2451	822	AGSMON
7755	1076	SBIT7	7762	474	USEQRJIS	04,3315	283	MODROUTB	13,2747	157	OPTSTALL	30,3414	848	FSTEP
7755	998	SUPER100	7763	474	OURRCBIT	05,2535	262	ENDRTOUT	15,2236	335	NOMDNLST	30,3415	848	SLOPE
7756	1076	SBIT6	7763	997	ONE	05,3077	271	ENDRUTIN	15,2236	335	UPDNLIST	30,3416	848	VEXSTEP
7756	474	ULLAGER	7763	1076	SBIT1	06,2000	63	PRDTTAB	16,2242	491	WFORPURR	30,3536	852	PEXTRA
7757	474	AORBSYSI	7763	1077	S+1	06,2001	63	CADRTAB	17,2620	533	ATTSTEER	31,2333	813	MTABLE
7757	481	ENGINBIT	7764	997	NOUTCON	06,2006	67	4.2SPOT	17,3502	545	-TJMINUR	33,2640	912	DP.5
7757	177	LOKONFLG	7765	280	DSPMSK	06,2006	66	3.2SPOT	20,2072	476	SETRATE	33,2642	912	DP0
7757	1076	SBIT5	7765	998	LOW3	06,3363	376	TRIMCODE	22,2000	875	PREBURN	36,3667	945	TFACT
7760	474	ACCAORZX												

MEMORY TYPE & AVAILABILITY DISPLAY

0000	TO	0057	SPECIAL OR NONEXISTENT MEMORY	13,2000	TO	13,3616	RESERVED FIXED MEMORY
		0060	AVAILABLE ERASABLE MEMORY	13,3617	TO	13,3777	AVAILABLE FIXED MEMORY
0061	TO	0776	RESERVED ERASABLE MEMORY	14,2000	TO	14,3754	RESERVED FIXED MEMORY
		0777	AVAILABLE ERASABLE MEMORY	14,3755	TO	14,3777	AVAILABLE FIXED MEMORY
1000	TO	1346	RESERVED ERASABLE MEMORY	15,2000	TO	15,3727	RESERVED FIXED MEMORY
1347	TO	1352	AVAILABLE ERASABLE MEMORY	15,3730	TO	15,3777	AVAILABLE FIXED MEMORY
1353	TO	E3,1775	RESERVED ERASABLE MEMORY	16,2000	TO	16,3764	RESERVED FIXED MEMORY
E3,1776	TO	E3,1777	AVAILABLE ERASABLE MEMORY	16,3765	TO	16,3777	AVAILABLE FIXED MEMORY
E4,1400	TO	E4,1746	RESERVED ERASABLE MEMORY	17,2000	TO	17,3771	RESERVED FIXED MEMORY
E4,1747	TO	E4,1750	AVAILABLE ERASABLE MEMORY	17,3772	TO	17,3777	AVAILABLE FIXED MEMORY
E4,1751	TO	E5,1776	RESERVED ERASABLE MEMORY	20,2000	TO	21,3773	RESERVED FIXED MEMORY
		E5,1777	AVAILABLE ERASABLE MEMORY	21,3774	TO	21,3777	AVAILABLE FIXED MEMORY
E6,1400	TO	E6,1766	RESERVED ERASABLE MEMORY	22,2000	TO	22,3744	RESERVED FIXED MEMORY
E6,1767	TO	E6,1777	AVAILABLE ERASABLE MEMORY	22,3745	TO	22,3777	AVAILABLE FIXED MEMORY
E7,1400	TO	E7,1627	RESERVED ERASABLE MEMORY	23,2000	TO	23,3365	RESERVED FIXED MEMORY
E7,1630	TO	E7,1775	AVAILABLE ERASABLE MEMORY	23,3366	TO	23,3777	AVAILABLE FIXED MEMORY
E7,1776	TO	E7,1777	RESERVED ERASABLE MEMORY	24,2000	TO	24,3746	RESERVED FIXED MEMORY
4000	TO	5755	RESERVED FIXED MEMORY	24,3747	TO	24,3777	AVAILABLE FIXED MEMORY
5756	TO	5777	AVAILABLE FIXED MEMORY	25,2000	TO	25,3030	RESERVED FIXED MEMORY
6000	TO	7774	RESERVED FIXED MEMORY	25,3031	TO	25,3777	AVAILABLE FIXED MEMORY
7775	TO	7777	AVAILABLE FIXED MEMORY	26,2000	TO	26,3177	RESERVED FIXED MEMORY
00,2000	TO	00,3736	RESERVED FIXED MEMORY	26,3200	TO	26,3777	AVAILABLE FIXED MEMORY
00,3737	TO	00,3777	AVAILABLE FIXED MEMORY	27,2000	TO	27,3611	RESERVED FIXED MEMORY
01,2000	TO	01,3675	RESERVED FIXED MEMORY	27,3612	TO	27,3777	AVAILABLE FIXED MEMORY
01,3676	TO	01,3777	AVAILABLE FIXED MEMORY	30,2000	TO	30,3773	RESERVED FIXED MEMORY
02,2000	TO	03,3777	SPECIAL OR NONEXISTENT MEMORY	30,3774	TO	30,3777	AVAILABLE FIXED MEMORY
04,2000	TO	04,3560	RESERVED FIXED MEMORY	31,2000	TO	31,2421	RESERVED FIXED MEMORY
04,3561	TO	04,3777	AVAILABLE FIXED MEMORY	31,2422	TO	31,3777	AVAILABLE FIXED MEMORY
05,2000	TO	05,3526	RESERVED FIXED MEMORY	32,2000	TO	32,3132	RESERVED FIXED MEMORY
05,3527	TO	05,3777	AVAILABLE FIXED MEMORY	32,3133	TO	32,3777	AVAILABLE FIXED MEMORY
06,2000	TO	06,3515	RESERVED FIXED MEMORY	33,2000	TO	33,3524	RESERVED FIXED MEMORY
06,3516	TO	06,3777	AVAILABLE FIXED MEMORY	33,3525	TO	33,3777	AVAILABLE FIXED MEMORY
07,2000	TO	07,3760	RESERVED FIXED MEMORY	34,2000	TO	34,3761	RESERVED FIXED MEMORY
07,3761	TO	07,3777	AVAILABLE FIXED MEMORY	34,3762	TO	34,3777	AVAILABLE FIXED MEMORY
10,2000	TO	10,3350	RESERVED FIXED MEMORY	35,2000	TO	35,3612	RESERVED FIXED MEMORY
10,3351	TO	10,3777	AVAILABLE FIXED MEMORY	35,3613	TO	35,3777	AVAILABLE FIXED MEMORY
11,2000	TO	11,3324	RESERVED FIXED MEMORY	36,2000	TO	36,3675	RESERVED FIXED MEMORY
11,3325	TO	11,3777	AVAILABLE FIXED MEMORY	36,3676	TO	36,3777	AVAILABLE FIXED MEMORY
12,2000	TO	12,3626	RESERVED FIXED MEMORY	37,2000	TO	37,3746	RESERVED FIXED MEMORY
12,3627	TO	12,3777	AVAILABLE FIXED MEMORY	37,3747	TO	43,3777	AVAILABLE FIXED MEMORY

MEMORY TYPE & AVAILABILITY DISPLAY

44,2000 TO 67,3777 SPECIAL OR NONEXISTENT MEMORY

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4047 TO 4063	61	5307 TO 5332	951	6601 TO 6634	971	00,2421 TO 00,2434	1010
4064 TO 4072	72	5333 TO 5335	952	6635 TO 6702	972	00,2435 TO 00,2475	1011
4073 TO 4104	74	5336 TO	997	6703	973	00,2476 TO 00,2513	1012
4105 TO 4116	76	5337 TO 5353	998	6704 TO 6737	974	00,2514 TO 00,2543	1013
4117 TO 4140	77	5354 TO 5416	1046	6740 TO 7000	975	00,2544 TO 00,2563	1014
4141 TO 4170	81	5417 TO 5466	1047	7001 TO 7024	976	00,2564 TO 00,2600	1015
4171 TO 4236	82	5467 TO 5504	1048	7025 TO 7052	977	00,2601 TO 00,2615	1016
4237 TO 4241	83	5505 TO 5544	1049	7053 TO 7102	978	00,2616 TO 00,2627	1017
4242 TO 4245	85	5545 TO 5575	1050	7103 TO 7141	979	00,2630 TO 00,2670	1018
4246 TO 4271	87	5576 TO 5631	1060	7142 TO 7154	980	00,2671 TO 00,2726	1019
4272 TO 4273	100	5632 TO 5662	1061	7155 TO 7207	981	00,2727 TO 00,2756	1020
4274 TO 4310	104	5663 TO 5673	1063	7210 TO 7225	982	00,2757 TO 00,3001	1021
4311 TO 4313	105	5674 TO 5713	1064	7226 TO 7266	983	00,3002 TO 00,3051	1022
4314 TO 4322	137	5714 TO 5726	1065	7267 TO 7310	984	00,3052 TO 00,3110	1023
4323 TO 4333	168	5727 TO 5740	1072	7311 TO 7326	985	00,3111 TO 00,3130	1024
4334 TO 4376	169	5741 TO 5752	1073	7327 TO 7374	986	00,3131 TO 00,3153	1025
4377 TO 4434	170	5753 TO 5754	946	7375 TO 7407	987	00,3154 TO 00,3211	1026
4435 TO 4443	277	6000 TO 6012	315	7410 TO 7420	988	00,3212 TO 00,3261	1027
4444 TO 4457	287	6013 TO 6036	484	7421 TO 7457	989	00,3262 TO 00,3324	1028
4460 TO 4465	288	6037 TO 6040	485	7460 TO 7503	990	00,3325 TO 00,3365	1029
4466 TO 4506	289	6041 TO 6050	486	7504 TO 7537	991	00,3366 TO 00,3436	1030
4507 TO 4512	290	6051 TO 6100	830	7540 TO 7576	992	00,3437 TO 00,3477	1031
4513 TO 4543	302	6101 TO 6111	831	7577 TO 7623	993	00,3500 TO 00,3533	1032
4544 TO 4604	303	6112 TO 6123	955	7624 TO 7655	994	00,3534 TO 00,3570	1033
4605 TO 4631	304	6124 TO 6146	954	7656 TO 7706	995	00,3571 TO 00,3632	1034
4632 TO 4646	306	6147 TO 6160	955	7707 TO 7741	996	00,3633 TO 00,3674	1035
4647 TO 4665	307	6161 TO 6207	956	7742 TO 7771	997	00,3675 TO 00,3711	1036
4666 TO 4735	308	6210 TO 6256	957	7772 TO 7773	946	00,3712 TO 00,3733	1037
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5067 TO 5125	800	6423 TO 6440	965	00,2172 TO 00,2213	1004	01,2232 TO 01,2301	93
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15,2332 TO 15,2353	337	16,2427 TO 16,2501	495	17,2731 TO 17,2775	536	20,3030 TO 20,3047	585
15,2354 TO 15,2417	338	16,2502 TO 16,2550	496	17,2776 TO 17,3050	537	20,3050 TO 20,3104	586
15,2420 TO 15,2424	339	16,2551 TO 16,2612	497	17,3051 TO 17,3115	538	20,3105 TO 20,3156	587
15,2425 TO 15,2462	340	16,2613 TO 16,2641	498	17,3116 TO 17,3163	539	20,3157 TO 20,3213	588
15,2463 TO 15,2475	341	16,2642	500	17,3164 TO 17,3232	540	20,3214 TO 20,3244	589
15,2476 TO 15,2530	342	16,2643 TO 16,2714	501	17,3233 TO 17,3303	541	20,3245 TO 20,3304	607
15,2531 TO 15,2564	343	16,2715 TO 16,2761	502	17,3304 TO 17,3354	542	20,3305 TO 20,3347	608
15,2565 TO 15,2600	344	16,2762 TO 16,3014	503	17,3355 TO 17,3425	543	20,3350 TO 20,3407	609
15,2601 TO 15,2646	345	16,3015 TO 16,3067	504	17,3426 TO 17,3436	544	20,3410 TO 20,3434	610
15,2647 TO 15,2712	346	16,3070 TO 16,3073	505	17,3437 TO 17,3504	545	20,3435 TO 20,3437	611
15,2713 TO 15,2740	347	16,3074 TO 16,3153	506	17,3505 TO 17,3510	546	20,3440 TO 20,3462	618
15,2741 TO 15,2777	348	16,3154 TO 16,3235	507	17,3511 TO 17,3532	547	20,3463 TO 20,3512	619
15,3000 TO 15,3030	349	16,3236 TO 16,3315	508	17,3533 TO 17,3601	548	20,3513 TO 20,3530	620
15,3031 TO 15,3062	350	16,3316 TO 16,3374	509	17,3602 TO 17,3647	549	20,3531 TO 20,3566	621
15,3063 TO 15,3113	351	16,3375 TO 16,3401	510	17,3650 TO 17,3720	550	20,3567 TO 20,3627	622
15,3114 TO 15,3153	352	16,3402 TO 16,3407	512	17,3721 TO 17,3766	551	20,3630 TO 20,3664	623
15,3154 TO 15,3226	353	16,3410 TO 16,3471	513	17,3767 TO 17,3770	946	20,3665 TO 20,3704	624
15,3227 TO 15,3240	354	16,3472 TO 16,3551	514	20,2000 TO 20,2045	136	20,3705 TO 20,3744	625
15,3241 TO 15,3303	355	16,3552 TO 16,3626	515	20,2046 TO 20,2107	475	20,3745 TO 20,3761	626
15,3304 TO 15,3354	356	16,3627 TO 16,3672	516	20,2110 TO 20,2126	476	20,3762 TO 20,3766	627
15,3355 TO 15,3401	357	16,3673 TO 16,3745	517	20,2127 TO 20,2144	477	20,3767 TO 20,3774	628
15,3402 TO 15,3427	358	16,3746 TO 16,3761	518	20,2145 TO 20,2174	478	20,3775 TO 20,3776	946

OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE
21,2000 TO 21,2036	574	22,2235 TO 22,2305	881	23,2620 TO 23,2660	438	25,2047 TO 25,2113	688
21,2037 TO 21,2103	575	22,2306 TO 22,2367	882	23,2661 TO 23,2725	439	25,2114 TO 25,2162	689
21,2104 TO 21,2134	576	22,2370 TO 22,2441	883	23,2726 TO 23,2770	440	25,2163 TO 25,2227	690
21,2135 TO 21,2167	577	22,2442 TO 22,2515	884	23,2771 TO 23,3023	441	25,2230 TO 25,2274	691
21,2170 TO 21,2243	578	22,2516 TO 22,2554	885	23,3024 TO 23,3070	442	25,2275 TO 25,2337	692
21,2244 TO 21,2314	579	22,2555 TO 22,2616	886	23,3071 TO 23,3102	443	25,2340 TO 25,2405	693
21,2315 TO 21,2372	580	22,2617 TO 22,2666	887	23,3103 TO 23,3132	444	25,2406 TO 25,2447	694
21,2373 TO 21,2411	581	22,2667 TO 22,2701	888	23,3133 TO 23,3167	445	25,2450 TO 25,2473	695
21,2412 TO 21,2456	582	22,2702 TO 22,2733	889	23,3170 TO 23,3233	446	25,2474 TO 25,2542	713
21,2457 TO 21,2540	583	22,2734 TO 22,3000	890	23,3234 TO 23,3270	447	25,2543 TO 25,2610	714
21,2541 TO 21,2543	584	22,3001 TO 22,3016	891	23,3271 TO 23,3327	448	25,2611 TO 25,2662	715
21,2544 TO 21,2560	585	22,3017 TO 22,3056	892	23,3330 TO 23,3362	449	25,2663 TO 25,2730	716
21,2561 TO 21,2571	590	22,3057 TO 22,3076	893	23,3363 TO 23,3364	946	25,2731 TO 25,2775	717
21,2572 TO 21,2624	591	22,3077 TO 22,3120	894	24,2000 TO 24,2046	411	25,2776 TO 25,3003	718
21,2625 TO 21,2670	592	22,3121 TO 22,3171	895	24,2047 TO 24,2125	412	25,3004 TO 25,3025	719
21,2671 TO 21,2733	593	22,3172 TO 22,3236	896	24,2126 TO 24,2206	413	25,3046 TO 25,3027	946
21,2734 TO 21,2776	594	22,3237 TO 22,3270	897	24,2207 TO 24,2251	414	26,2000 TO 26,2056	321
21,2777 TO 21,3032	595	22,3271 TO 22,3326	898	24,2252 TO 24,2326	415	26,2057 TO 26,2140	322
21,3033 TO 21,3100	596	22,3327 TO 22,3351	899	24,2327 TO 24,2406	416	26,2141 TO 26,2221	323
21,3101 TO 21,3150	597	22,3352 TO 22,3356	900	24,2407 TO 24,2450	417	26,2222 TO 26,2277	324
21,3151 TO 21,3223	598	22,3357 TO 22,3425	901	24,2451 TO 24,2531	418	26,2300 TO 26,2357	325
21,3224 TO 21,3263	599	22,3426 TO 22,3470	902	24,2532 TO 24,2610	419	26,2360 TO 26,2440	326
21,3264 TO 21,3306	600	22,3471 TO 22,3520	903	24,2611 TO 24,2665	420	26,2441 TO 26,2517	327
21,3307 TO 21,3344	602	22,3521 TO 22,3535	904	24,2666 TO 24,2742	421	26,2520 TO 26,2524	328
21,3345 TO 21,3407	603	22,3536 TO 22,3561	905	24,2743 TO 24,2775	422	26,2525 TO 26,2532	552
21,3410 TO 21,3416	604	22,3562 TO 22,3610	906	24,2776 TO 24,3056	423	26,2533 TO 26,2575	553
21,3417 TO 21,3462	629	22,3611 TO 22,3646	907	24,3057 TO 24,3067	424	26,2576 TO 26,2636	571
21,3463 TO 21,3530	630	22,3647 TO 22,3704	908	24,3070 TO 24,3132	425	26,2637 TO 26,2652	572
21,3531 TO 21,3572	631	22,3705 TO 22,3741	909	24,3133 TO 24,3213	426	26,2653 TO 26,2712	573
21,3573 TO 21,3621	632	22,3742 TO 22,3743	946	24,3214 TO 24,3267	427	26,2713 TO 26,2754	612
21,3622 TO 21,3671	633	23,2000 TO 23,2036	294	24,3270 TO 24,3351	428	26,2755 TO 26,3021	613
21,3672 TO 21,3735	634	23,2037 TO 23,2107	295	24,3352 TO 24,3430	429	26,3022 TO 26,3070	614
21,3736 TO 21,3770	635	23,2110 TO 23,2162	296	24,3431 TO 24,3467	430	26,3071 TO 26,3150	615
21,3771 TO 21,3772	946	23,2163 TO 23,2242	297	24,3470 TO 24,3532	431	26,3151 TO 26,3174	616
22,2000 TO 22,2033	875	23,2243 TO 23,2321	298	24,3533 TO 24,3602	432	26,3175 TO 26,3176	946
22,2034 TO 22,2067	876	23,2322 TO 23,2377	299	24,3603 TO 24,3634	433	27,2000 TO 27,2004	674
22,2070 TO 22,2123	877	23,2400 TO 23,2454	300	24,3635 TO 24,3713	434	27,2005 TO 27,2050	675
22,2124 TO 22,2137	878	23,2455 TO 23,2517	301	24,3714 TO 24,3743	435	27,2051 TO 27,2064	676
22,2140 TO 22,2175	879	23,2520 TO 23,2555	436	24,3744 TO 24,3745	946	27,2065 TO 27,2126	678
22,2176 TO 22,2234	880	23,2556 TO 23,2617	437	25,2000 TO 25,2046	687	27,2127 TO 27,2203	679

OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE
27,2204 TO 27,2253	680	30,2436 TO 30,2463	828	31,2410 TO 31,2416	814	33,3416 TO 33,3464	737
27,2254 TO 27,2321	681	30,2464 TO 30,2487	829	31,2417 TO 31,2420	947	33,3465 TO 33,3521	738
27,2322 TO 27,2357	682	30,2470 TO 30,2503	832	32,2000 TO 32,2047	911	33,3522 TO 33,3523	947
27,2360 TO 27,2427	683	30,2504 TO 30,2552	833	32,2050 TO 32,2124	912	34,2000 TO 34,2055	645
27,2430 TO 27,2445	684	30,2553 TO 30,2573	834	32,2125 TO 32,2142	913	34,2056 TO 34,2131	646
27,2446 TO 27,2503	685	30,2574 TO 30,2602	835	32,2143 TO 32,2224	914	34,2132 TO 34,2205	647
27,2504 TO 27,2510	709	30,2603 TO 30,2650	836	32,2225 TO 32,2305	915	34,2206 TO 34,2263	648
27,2511 TO 27,2554	710	30,2651 TO 30,2676	837	32,2306 TO 32,2365	916	34,2264 TO 34,2341	649
27,2555 TO 27,2563	711	30,2677 TO 30,2713	838	32,2366 TO 32,2447	917	34,2342 TO 34,2406	650
27,2564 TO 27,2612	721	30,2714 TO 30,2771	839	32,2450 TO 32,2527	918	34,2407 TO 34,2444	653
27,2613 TO 27,2661	722	30,2772 TO 30,3041	840	32,2530 TO 32,2607	919	34,2445 TO 34,2505	654
27,2662 TO 27,2667	723	30,3042 TO 30,3102	841	32,2610 TO 32,2666	920	34,2506 TO 34,2563	655
27,2670 TO 27,2732	724	30,3103 TO 30,3140	842	32,2667 TO 32,2744	921	34,2564 TO 34,2627	656
27,2733 TO 27,3002	725	30,3141 TO 30,3205	843	32,2745 TO 32,3004	922	34,2630 TO 34,2710	657
27,3003 TO 27,3050	726	30,3206 TO 30,3221	844	32,3005 TO 32,3027	923	34,2711 TO 34,2734	658
27,3051 TO 27,3113	727	30,3222 TO 30,3272	845	32,3030 TO 32,3057	924	34,2735 TO 34,2760	659
27,3114 TO 27,3152	754	30,3273 TO 30,3351	846	32,3060 TO 32,3127	925	34,2761 TO 34,3005	660
27,3153 TO 27,3220	755	30,3352 TO 30,3413	847	32,3130 TO 32,3131	947	34,3006 TO 34,3065	661
27,3221 TO 27,3263	756	30,3414 TO 30,3444	848	33,2000 TO 33,2015	696	34,3066 TO 34,3147	662
27,3264 TO 27,3327	757	30,3445 TO 30,3465	850	33,2016 TO 33,2062	697	34,3150 TO 34,3231	663
27,3330 TO 27,3333	758	30,3466 TO 30,3506	851	33,2063 TO 33,2127	698	34,3232 TO 34,3313	664
27,3334 TO 27,3352	759	30,3507 TO 30,3546	852	33,2130 TO 33,2172	699	34,3314 TO 34,3374	665
27,3353 TO 27,3407	760	30,3547 TO 30,3576	853	33,2173 TO 33,2243	700	34,3375 TO 34,3454	666
27,3410 TO 27,3450	761	30,3577 TO 30,3612	854	33,2244 TO 33,2325	701	34,3455 TO 34,3475	667
27,3451 TO 27,3507	762	30,3613 TO 30,3641	855	33,2326 TO 33,2374	702	34,3476 TO 34,3551	668
27,3510 TO 27,3521	763	30,3642 TO 30,3676	856	33,2375 TO 33,2442	703	34,3552 TO 34,3625	669
27,3522 TO 27,3534	764	30,3677 TO 30,3724	857	33,2443 TO 33,2510	704	34,3626 TO 34,3665	670
27,3535 TO 27,3606	765	30,3725 TO 30,3770	858	33,2511 TO 33,2557	705	34,3666 TO 34,3713	671
27,3607 TO 27,3610	946	30,3771 TO 30,3772	946	33,2560 TO 33,2615	706	34,3714 TO 34,3756	672
30,2000 TO 30,2040	817	31,2000 TO 31,2037	801	33,2616 TO 33,2661	707	34,3757 TO 34,3760	947
30,2041 TO 30,2046	818	31,2040 TO 31,2054	802	33,2662 TO 33,2723	708	35,2000 TO 35,2013	77
30,2047 TO 30,2113	819	31,2055 TO 31,2123	803	33,2724 TO 33,2732	728	35,2014 TO 35,2061	452
30,2114 TO 30,2132	820	31,2124 TO 31,2130	804	33,2733 TO 33,3004	729	35,2062 TO 35,2121	453
30,2133 TO 30,2175	821	31,2131 TO 31,2152	805	33,3005 TO 33,3051	730	35,2122 TO 35,2200	454
30,2176 TO 30,2242	822	31,2153 TO 31,2164	808	33,3052 TO 33,3121	731	35,2201 TO 35,2260	455
30,2243 TO 30,2310	823	31,2165 TO 31,2220	809	33,3122 TO 33,3166	732	35,2261 TO 35,2337	456
30,2311 TO 30,2326	824	31,2221 TO 31,2264	810	33,3167 TO 33,3232	733	35,2340 TO 35,2416	457
30,2327 TO 30,2365	825	31,2265 TO 31,2324	811	33,3233 TO 33,3300	734	35,2417 TO 35,2500	458
30,2366 TO 30,2411	826	31,2325 TO 31,2357	812	33,3301 TO 33,3347	735	35,2501 TO 35,2557	459
30,2412 TO 30,2435	827	31,2360 TO 31,2407	813	33,3350 TO 33,3415	736	35,2560 TO 35,2632	460

OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE	OCCUPIED LOCATIONS	PAGE
35,2633 TO 35,2701	461	35,3610 TO 35,3611	947	36,3112 TO 36,3132	933	37,2352 TO 37,2425	1083
35,2702 TO 35,2707	462	36,2000 TO 36,2030	739	36,3133 TO 36,3145	934	37,2426 TO 37,2504	1084
35,2710 TO 35,2716	463	36,2031 TO 36,2076	740	36,3146 TO 36,3162	935	37,2505 TO 37,2563	1085
35,2717 TO 35,2756	464	36,2077 TO 36,2147	741	36,3163 TO 36,3242	936	37,2564 TO 37,2641	1086
35,2757 TO 35,3003	465	36,2150 TO 36,2214	742	36,3243 TO 36,3320	937	37,2642 TO 37,2711	1087
35,3004 TO 35,3043	466	36,2215 TO 36,2261	743	36,3321 TO 36,3345	938	37,2712 TO 37,2764	1088
35,3044 TO 35,3122	467	36,2262 TO 36,2277	744	36,3346 TO 36,3413	939	37,2765 TO 37,3040	1089
35,3123 TO 35,3176	468	36,2300 TO 36,2334	745	36,3414 TO 36,3471	940	37,3041 TO 37,3112	1090
35,3177 TO 35,3250	469	36,2335 TO 36,2353	746	36,3472 TO 36,3512	941	37,3113 TO 37,3162	1091
35,3251 TO 35,3325	470	36,2354 TO 36,2402	747	36,3513 TO 36,3552	942	37,3163 TO 37,3240	1092
35,3326 TO 35,3375	471	36,2403 TO 36,2446	748	36,3553 TO 36,3601	943	37,3241 TO 37,3316	1093
35,3376 TO 35,3416	472	36,2447 TO 36,2512	749	36,3602 TO 36,3634	944	37,3317 TO 37,3362	1094
35,3417 TO 35,3471	651	36,2513 TO 36,2515	750	36,3635 TO 36,3672	945	37,3363 TO 37,3441	1095
35,3472 TO 35,3500	652	36,2516 TO 36,2544	751	36,3673 TO 36,3674	947	37,3442 TO 37,3520	1096
35,3501 TO 35,3510	653	36,2545 TO 36,2602	752	37,2000 TO 37,2022	1077	37,3521 TO 37,3573	1097
35,3511 TO 35,3517	654	36,2603 TO 36,2624	753	37,2023 TO 37,2100	1078	37,3574 TO 37,3643	1098
35,3520 TO 35,3544	671	36,2625 TO 36,2704	929	37,2101 TO 37,2151	1079	37,3644 TO 37,3720	1099
35,3545	672	36,2705 TO 36,2764	930	37,2152 TO 37,2222	1080	37,3721 TO 37,3743	1100
35,3546 TO 35,3562	869	36,2765 TO 36,3045	931	37,2223 TO 37,2274	1081	37,3744 TO 37,3745	947
35,3563 TO 35,3607	870	36,3046 TO 36,3111	932	37,2275 TO 37,2351	1082		

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH.

4000	4377	PARAGRAPH # 010	ROPE MODULE 1, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
4400	4777	PARAGRAPH # 011	ROPE MODULE 1, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
5000	5377	PARAGRAPH # 012	ROPE MODULE 1, SIDE A, SENSE LINE SET 06 (WIRES 81-96)
5400	5777	PARAGRAPH # 013	ROPE MODULE 1, SIDE B, SENSE LINE SET 06 (WIRES 81-96)
6000	6377	PARAGRAPH # 014	ROPE MODULE 1, SIDE A, SENSE LINE SET 07 (WIRES 97-112)
6400	6777	PARAGRAPH # 015	ROPE MODULE 1, SIDE B, SENSE LINE SET 07 (WIRES 97-112)
7000	7377	PARAGRAPH # 016	ROPE MODULE 1, SIDE A, SENSE LINE SET 08 (WIRES 113-128)
7400	7777	PARAGRAPH # 017	ROPE MODULE 1, SIDE B, SENSE LINE SET 08 (WIRES 113-128)
00,2000	00,2377	PARAGRAPH # 020	ROPE MODULE 1, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
00,2400	00,2777	PARAGRAPH # 021	ROPE MODULE 1, SIDE B, SENSE LINE SET 01 (WIRES 1-16)
00,3000	00,3377	PARAGRAPH # 022	ROPE MODULE 1, SIDE A, SENSE LINE SET 02 (WIRES 17-32)
00,3400	00,3777	PARAGRAPH # 023	ROPE MODULE 1, SIDE B, SENSE LINE SET 02 (WIRES 17-32)
01,2000	01,2377	PARAGRAPH # 024	ROPE MODULE 1, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
01,2400	01,2777	PARAGRAPH # 025	ROPE MODULE 1, SIDE B, SENSE LINE SET 03 (WIRES 33-48)
01,3000	01,3377	PARAGRAPH # 026	ROPE MODULE 1, SIDE A, SENSE LINE SET 04 (WIRES 49-64)
01,3400	01,3777	PARAGRAPH # 027	ROPE MODULE 1, SIDE B, SENSE LINE SET 04 (WIRES 49-64)
04,2000	04,2377	PARAGRAPH # 040	ROPE MODULE 1, SIDE A, SENSE LINE SET 09 (WIRES 129-144)
04,2400	04,2777	PARAGRAPH # 041	ROPE MODULE 1, SIDE B, SENSE LINE SET 09 (WIRES 129-144)
04,3000	04,3377	PARAGRAPH # 042	ROPE MODULE 1, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
04,3400	04,3777	PARAGRAPH # 043	ROPE MODULE 1, SIDE B, SENSE LINE SET 10 (WIRES 145-160)
05,2000	05,2377	PARAGRAPH # 044	ROPE MODULE 1, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
05,2400	05,2777	PARAGRAPH # 045	ROPE MODULE 1, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
05,3000	05,3377	PARAGRAPH # 046	ROPE MODULE 1, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
05,3400	05,3777	PARAGRAPH # 047	ROPE MODULE 1, SIDE B, SENSE LINE SET 12 (WIRES 177-192)
06,2000	06,2377	PARAGRAPH # 050	ROPE MODULE 2, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
06,2400	06,2777	PARAGRAPH # 051	ROPE MODULE 2, SIDE B, SENSE LINE SET 01 (WIRES 1-16)
06,3000	06,3377	PARAGRAPH # 052	ROPE MODULE 2, SIDE A, SENSE LINE SET 02 (WIRES 17-32)
06,3400	06,3777	PARAGRAPH # 053	ROPE MODULE 2, SIDE B, SENSE LINE SET 02 (WIRES 17-32)
07,2000	07,2377	PARAGRAPH # 054	ROPE MODULE 2, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
07,2400	07,2777	PARAGRAPH # 055	ROPE MODULE 2, SIDE B, SENSE LINE SET 03 (WIRES 33-48)
07,3000	07,3377	PARAGRAPH # 056	ROPE MODULE 2, SIDE A, SENSE LINE SET 04 (WIRES 49-64)
07,3400	07,3777	PARAGRAPH # 057	ROPE MODULE 2, SIDE B, SENSE LINE SET 04 (WIRES 49-64)
10,2000	10,2377	PARAGRAPH # 060	ROPE MODULE 2, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
10,2400	10,2777	PARAGRAPH # 061	ROPE MODULE 2, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
10,3000	10,3377	PARAGRAPH # 062	ROPE MODULE 2, SIDE A, SENSE LINE SET 06 (WIRES 81-96)
11,2000	11,2377	PARAGRAPH # 064	ROPE MODULE 2, SIDE A, SENSE LINE SET 07 (WIRES 97-112)
11,2400	11,2777	PARAGRAPH # 065	ROPE MODULE 2, SIDE B, SENSE LINE SET 07 (WIRES 97-112)
11,3000	11,3377	PARAGRAPH # 066	ROPE MODULE 2, SIDE A, SENSE LINE SET 08 (WIRES 113-128)
12,2000	12,2377	PARAGRAPH # 070	ROPE MODULE 2, SIDE A, SENSE LINE SET 09 (WIRES 129-144)
12,2400	12,2777	PARAGRAPH # 071	ROPE MODULE 2, SIDE B, SENSE LINE SET 09 (WIRES 129-144)

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH.

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12,3000  TO 12,3377   PARAGRAPH # 072    ROPE MODULE 2, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
12,3400  TO 12,3777   PARAGRAPH # 073    ROPE MODULE 2, SIDE B, SENSE LINE SET 10 (WIRES 145-160)

13,2000  TO 13,2377   PARAGRAPH # 074    ROPE MODULE 2, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
13,2400  TO 13,2777   PARAGRAPH # 075    ROPE MODULE 2, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
13,3000  TO 13,3377   PARAGRAPH # 076    ROPE MODULE 2, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
13,3400  TO 13,3777   PARAGRAPH # 077    ROPE MODULE 2, SIDE B, SENSE LINE SET 12 (WIRES 177-192)

14,2000  TO 14,2377   PARAGRAPH # 100    ROPE MODULE 3, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
14,2400  TO 14,2777   PARAGRAPH # 101    ROPE MODULE 3, SIDE B, SENSE LINE SET 01 (WIRES 1-16)
14,3000  TO 14,3377   PARAGRAPH # 102    ROPE MODULE 3, SIDE A, SENSE LINE SET 02 (WIRES 17-32)
14,3400  TO 14,3777   PARAGRAPH # 103    ROPE MODULE 3, SIDE B, SENSE LINE SET 02 (WIRES 17-32)

15,2000  TO 15,2377   PARAGRAPH # 104    ROPE MODULE 3, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
15,2400  TO 15,2777   PARAGRAPH # 105    ROPE MODULE 3, SIDE B, SENSE LINE SET 03 (WIRES 33-48)
15,3000  TO 15,3377   PARAGRAPH # 106    ROPE MODULE 3, SIDE A, SENSE LINE SET 04 (WIRES 49-64)
15,3400  TO 15,3777   PARAGRAPH # 107    ROPE MODULE 3, SIDE B, SENSE LINE SET 04 (WIRES 49-64)

16,2000  TO 16,2377   PARAGRAPH # 110    ROPE MODULE 3, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
16,2400  TO 16,2777   PARAGRAPH # 111    ROPE MODULE 3, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
16,3000  TO 16,3377   PARAGRAPH # 112    ROPE MODULE 3, SIDE A, SENSE LINE SET 06 (WIRES 81-96)
16,3400  TO 16,3777   PARAGRAPH # 113    ROPE MODULE 3, SIDE B, SENSE LINE SET 06 (WIRES 81-96)

17,2000  TO 17,2377   PARAGRAPH # 114    ROPE MODULE 3, SIDE A, SENSE LINE SET 07 (WIRES 97-112)
17,2400  TO 17,2777   PARAGRAPH # 115    ROPE MODULE 3, SIDE B, SENSE LINE SET 07 (WIRES 97-112)
17,3000  TO 17,3377   PARAGRAPH # 116    ROPE MODULE 3, SIDE A, SENSE LINE SET 08 (WIRES 113-128)
17,3400  TO 17,3777   PARAGRAPH # 117    ROPE MODULE 3, SIDE B, SENSE LINE SET 08 (WIRES 113-128)

20,2000  TO 20,2377   PARAGRAPH # 120    ROPE MODULE 3, SIDE A, SENSE LINE SET 09 (WIRES 129-144)
20,2400  TO 20,2777   PARAGRAPH # 121    ROPE MODULE 3, SIDE B, SENSE LINE SET 09 (WIRES 129-144)
20,3000  TO 20,3377   PARAGRAPH # 122    ROPE MODULE 3, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
20,3400  TO 20,3777   PARAGRAPH # 123    ROPE MODULE 3, SIDE B, SENSE LINE SET 10 (WIRES 145-160)

21,2000  TO 21,2377   PARAGRAPH # 124    ROPE MODULE 3, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
21,2400  TO 21,2777   PARAGRAPH # 125    ROPE MODULE 3, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
21,3000  TO 21,3377   PARAGRAPH # 126    ROPE MODULE 3, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
21,3400  TO 21,3777   PARAGRAPH # 127    ROPE MODULE 3, SIDE B, SENSE LINE SET 12 (WIRES 177-192)

22,2000  TO 22,2377   PARAGRAPH # 130    ROPE MODULE 4, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
22,2400  TO 22,2777   PARAGRAPH # 131    ROPE MODULE 4, SIDE B, SENSE LINE SET 01 (WIRES 1-16)
22,3000  TO 22,3377   PARAGRAPH # 132    ROPE MODULE 4, SIDE A, SENSE LINE SET 02 (WIRES 17-32)
22,3400  TO 22,3777   PARAGRAPH # 133    ROPE MODULE 4, SIDE B, SENSE LINE SET 02 (WIRES 17-32)

23,2000  TO 23,2377   PARAGRAPH # 134    ROPE MODULE 4, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
23,2400  TO 23,2777   PARAGRAPH # 135    ROPE MODULE 4, SIDE B, SENSE LINE SET 03 (WIRES 33-48)
23,3000  TO 23,3377   PARAGRAPH # 136    ROPE MODULE 4, SIDE A, SENSE LINE SET 04 (WIRES 49-64)

24,2000  TO 24,2377   PARAGRAPH # 140    ROPE MODULE 4, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
24,2400  TO 24,2777   PARAGRAPH # 141    ROPE MODULE 4, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
24,3000  TO 24,3377   PARAGRAPH # 142    ROPE MODULE 4, SIDE A, SENSE LINE SET 06 (WIRES 81-96)
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PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH.

24,3400 TO 24,3777 PARAGRAPH # 143 ROPE MODULE 4, SIDE B, SENSE LINE SET 06 (WIRES 81-96)

25,2000 TO 25,2377 PARAGRAPH # 144 ROPE MODULE 4, SIDE A, SENSE LINE SET 07 (WIRES 97-112)
25,2400 TO 25,2777 PARAGRAPH # 145 ROPE MODULE 4, SIDE B, SENSE LINE SET 07 (WIRES 97-112)
25,3000 TO 25,3377 PARAGRAPH # 146 ROPE MODULE 4, SIDE A, SENSE LINE SET 08 (WIRES 113-128)

26,2000 TO 26,2377 PARAGRAPH # 150 ROPE MODULE 4, SIDE A, SENSE LINE SET 09 (WIRES 129-144)
26,2400 TO 26,2777 PARAGRAPH # 151 ROPE MODULE 4, SIDE B, SENSE LINE SET 09 (WIRES 129-144)
26,3000 TO 26,3377 PARAGRAPH # 152 ROPE MODULE 4, SIDE A, SENSE LINE SET 10 (WIRES 145-160)

27,2000 TO 27,2377 PARAGRAPH # 154 ROPE MODULE 4, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
27,2400 TO 27,2777 PARAGRAPH # 155 ROPE MODULE 4, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
27,3000 TO 27,3377 PARAGRAPH # 156 ROPE MODULE 4, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
27,3400 TO 27,3777 PARAGRAPH # 157 ROPE MODULE 4, SIDE B, SENSE LINE SET 12 (WIRES 177-192)

30,2000 TO 30,2377 PARAGRAPH # 160 ROPE MODULE 5, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
30,2400 TO 30,2777 PARAGRAPH # 161 ROPE MODULE 5, SIDE B, SENSE LINE SET 01 (WIRES 1-16)
30,3000 TO 30,3377 PARAGRAPH # 162 ROPE MODULE 5, SIDE A, SENSE LINE SET 02 (WIRES 17-32)
30,3400 TO 30,3777 PARAGRAPH # 163 ROPE MODULE 5, SIDE B, SENSE LINE SET 02 (WIRES 17-32)

31,2000 TO 31,2377 PARAGRAPH # 164 ROPE MODULE 5, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
31,2400 TO 31,2777 PARAGRAPH # 165 ROPE MODULE 5, SIDE B, SENSE LINE SET 03 (WIRES 33-48)

32,2000 TO 32,2377 PARAGRAPH # 170 ROPE MODULE 5, SIDE A, SENSE LINE SET 05 (WIRES 65-80)
32,2400 TO 32,2777 PARAGRAPH # 171 ROPE MODULE 5, SIDE B, SENSE LINE SET 05 (WIRES 65-80)
32,3000 TO 32,3377 PARAGRAPH # 172 ROPE MODULE 5, SIDE A, SENSE LINE SET 06 (WIRES 81-96)

33,2000 TO 33,2377 PARAGRAPH # 174 ROPE MODULE 5, SIDE A, SENSE LINE SET 07 (WIRES 97-112)
33,2400 TO 33,2777 PARAGRAPH # 175 ROPE MODULE 5, SIDE B, SENSE LINE SET 07 (WIRES 97-112)
33,3000 TO 33,3377 PARAGRAPH # 176 ROPE MODULE 5, SIDE A, SENSE LINE SET 08 (WIRES 113-128)
33,3400 TO 33,3777 PARAGRAPH # 177 ROPE MODULE 5, SIDE B, SENSE LINE SET 08 (WIRES 113-128)

34,2000 TO 34,2377 PARAGRAPH # 200 ROPE MODULE 5, SIDE A, SENSE LINE SET 09 (WIRES 129-144)
34,2400 TO 34,2777 PARAGRAPH # 201 ROPE MODULE 5, SIDE B, SENSE LINE SET 09 (WIRES 129-144)
34,3000 TO 34,3377 PARAGRAPH # 202 ROPE MODULE 5, SIDE A, SENSE LINE SET 10 (WIRES 145-160)
34,3400 TO 34,3777 PARAGRAPH # 203 ROPE MODULE 5, SIDE B, SENSE LINE SET 10 (WIRES 145-160)

35,2000 TO 35,2377 PARAGRAPH # 204 ROPE MODULE 5, SIDE A, SENSE LINE SET 11 (WIRES 161-176)
35,2400 TO 35,2777 PARAGRAPH # 205 ROPE MODULE 5, SIDE B, SENSE LINE SET 11 (WIRES 161-176)
35,3000 TO 35,3377 PARAGRAPH # 206 ROPE MODULE 5, SIDE A, SENSE LINE SET 12 (WIRES 177-192)
35,3400 TO 35,3777 PARAGRAPH # 207 ROPE MODULE 5, SIDE B, SENSE LINE SET 12 (WIRES 177-192)

36,2000 TO 36,2377 PARAGRAPH # 210 ROPE MODULE 6, SIDE A, SENSE LINE SET 01 (WIRES 1-16)
36,2400 TO 36,2777 PARAGRAPH # 211 ROPE MODULE 6, SIDE B, SENSE LINE SET 01 (WIRES 1-16)
36,3000 TO 36,3377 PARAGRAPH # 212 ROPE MODULE 6, SIDE A, SENSE LINE SET 02 (WIRES 17-32)
36,3400 TO 36,3777 PARAGRAPH # 213 ROPE MODULE 6, SIDE B, SENSE LINE SET 02 (WIRES 17-32)

37,2000 TO 37,2377 PARAGRAPH # 214 ROPE MODULE 6, SIDE A, SENSE LINE SET 03 (WIRES 33-48)
37,2400 TO 37,2777 PARAGRAPH # 215 ROPE MODULE 6, SIDE B, SENSE LINE SET 03 (WIRES 33-48)
37,3000 TO 37,3377 PARAGRAPH # 216 ROPE MODULE 6, SIDE A, SENSE LINE SET 04 (WIRES 49-64)

PARAGRAPHS GENERATED FOR THIS ASSEMBLY; ADDRESS LIMITS AND THE MANUFACTURING LOCATION CODE ARE SHOWN FOR EACH.

37,3400 TO 37,3777 PARAGRAPH # 217 ROPE MODULE 6, SIDE B, SENSE LINE SET 04 (WIRES 49-64)

OCTAL LISTING OF PARAGRAPH # 010, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

4000	00004 0	34054 1	56006 1	12163 0	52011 0	00006 1	35051 0	52006 0
4010	52011 0	00006 1	31001 1	52006 0	52011 0	34056 0	56006 1	13577 0
4020	52011 0	34063 0	56006 1	12000 1	52011 0	34057 1	56006 1	13474 1
4030	52011 0	34060 0	56006 1	13221 1	52011 0	34057 1	56006 1	13514 0
4040	52011 0	34061 1	56006 1	12001 0	52011 0	34062 1	56006 1	15736 1
4050	52011 0	37762 0	55007 0	15737 0	C; 02003 0	C; 04000 0	C; 02003 0	C; 26000 0
4060	C; 26003 0	C; 32007 1	C; 20001 1	C; 24006 1	22736 0	22006 1	50000 1	30001 0
4070	22006 1	22736 0	12454 1	22736 0	22006 1	22736 0	00006 1	50000 1
4100	30001 0	22736 0	22006 1	22736 0	12551 0	22002 0	71127 0	00006 1
4110	14114 0	06051 0	C; 04000 0	00001 0	06067 0	C; 04000 0	00001 0	50002 0
4120	30000 1	24002 0	56302 0	40000 0	60302 0	00006 1	17020 0	34132 0
4130	22006 1	15230 1	C; 72000 1	50002 0	40000 0	60302 0	00006 1	17017 1
4140	17015 0	00004 0	50002 0	30000 1	24002 0	54072 0	77765 0	60000 1
4150	54071 0	30072 1	74241 0	00006 1	77750 0	56072 1	77745 1	54066 0
4160	14164 1	00004 0	37763 1	54066 0	50002 0	30000 1	24002 0	54065 0
4170	00006 1	34174 1	52006 0	C; 02634 1	C; 14063 1	22073 0	22006 1	22073 0
4200	75640 1	10000 0	14242 0	30062 0	77755 0	10000 0	14226 1	50061 0
4210	31112 1	54070 1	30062 0	77754 1	10000 0	14232 1	30002 0	54063 0
4220	30006 1	54064 1	34225 0	22073 0	52006 0	C; 02722 1	50002 0	30000 1
4230	24002 0	14211 0	00006 1	50002 0	30001 0	52064 1	37762 0	26002 1
4240	14222 0	C; 17770 1	77750 0	10000 0	14226 1	14207 1	00004 0	54001 1
4250	50002 0	30000 1	24002 0	60000 1	54061 1	10001 1	14265 0	14265 0
4260	24000 1	54001 1	40025 1	50061 0	55111 0	40001 1	50061 0	53076 0
4270	00003 1	00002 0	05225 1	C; 02607 1	C; 37767 0	C; 37766 1	C; 02006 0	C; 74000 1
4300	C; 04025 1	C; 10003 0	C; 14031 0	C; 20033 0	C; 24017 1	C; 30036 1	C; 34034 1	C; 40023 1
4310	C; 44035 1	C; 50037 0	C; 54000 0	C; 60000 1	37767 0	54032 1	54033 0	54034 1
4320	00002 0	C; 00620 0	C; 00454 1	00006 1	64326 1	14327 1	40000 0	50002 0
4330	60000 1	00006 1	67017 0	17015 0	50002 0	30000 1	24002 0	00006 1
4340	50000 1	30001 0	52062 1	22002 0	37750 1	70412 1	10000 0	14362 0
4350	30061 0	04323 1	C; 66161 1	00001 0	34374 0	60062 0	04323 1	C; 64420 0
4360	00001 0	04372 0	34376 1	60062 0	04323 1	C; 65673 0	00001 0	30061 0
4370	04323 1	C; 51615 1	50001 0	00001 0	C; 00765 0	C; 00707 1	C; 16450 1	37763 1

OCTAL LISTING OF PARAGRAPH # 011, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "e" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

4400	70366 0	10000 0	00002 0	34433 1	70412 1	00006 1	14416 1	40412 1
4410	74434 1	00006 1	14416 1	37760 1	70412 1	10000 0	37754 0	60326 0
4420	77754 1	00006 1	17020 0	54001 1	30326 0	00006 1	06001 0	77743 1
4430	67745 0	54326 1	00002 0	C; 10102 0	C; 00220 1	34443 0	70311 0	54113 0
4440	04460 1	04442 1	05567 0	C; 07700 1	54113 0	10303 0	00002 0	30002 0
4450	67763 1	54331 1	04466 1	34457 0	56006 1	54332 1	02000 0	C; 12060 1
4460	30002 0	67763 1	54331 1	04453 1	52332 1	52006 0	47745 1	00004 0
4470	70312 0	67745 0	54312 0	00003 1	00002 0	37763 1	54303 0	22004 0
4500	56002 0	52124 1	05235 0	54327 0	05545 0	05567 0	10305 0	17015 0
4510	14475 1	00002 0	17017 1	54310 1	54003 0	74564 0	65352 0	54135 1
4520	00002 0	30310 0	14514 1	54003 0	74564 0	65352 0	00002 0	C; 00016 0
4530	C; 00011 1	C; 00004 0	54020 1	40020 1	40020 1	40020 1	40020 1	56020 0
4540	00002 0	54022 0	40022 0	40022 0	40022 0	40022 0	56022 1	00002 0
4550	60000 1	60000 1	60000 1	60000 1	60000 1	00002 0	C; 00037 0	C; 01740 0
4560	C; 76000 0	05663 1	05516 0	C; 03777 0	C; 00377 1	C; 00023 0	C; 00021 1	C; 00025 0
4570	C; 00012 1	37755 1	00006 1	05011 1	00002 0	47755 0	00006 1	03011 1
4600	00002 0	37757 0	00006 1	05011 1	00002 0	00006 1	30025 0	52014 0
4610	00002 0	00006 1	30146 1	20146 0	60144 0	26144 1	54007 1	00002 0
4620	54111 1	00002 0	37756 1	00006 1	05011 1	00002 0	47756 0	00006 1
4630	03011 1	00002 0	10330 0	00002 0	37763 1	54330 0	17015 0	35337 0
4640	00002 1	60004 0	05225 1	C; 10000 0	10330 0	14637 0	37763 1	54330 0
4650	00002 0	44656 1	60002 0	60004 0	05225 1	C; 10001 1	C; 02003 0	54113 0
4660	10303 0	14664 0	30002 0	14451 1	24002 0	14651 0	56002 0	54134 0
4670	37771 1	60330 1	00006 1	64701 0	04714 1	04701 0	05551 0	37763 1
4700	54330 0	00004 0	47757 1	00006 1	03011 1	37767 0	54303 0	00003 1
4710	00134 1	56002 0	54134 0	04701 0	37767 0	56333 1	56334 0	56335 1
4720	00006 1	17020 0	00004 0	17015 0	56002 0	54134 0	00004 0	34735 1
4730	05663 1	C; 03536 1	C; 10060 0	00003 1	00134 1	C; 00257 1	00004 0	30002 0
4740	55363 1	06003 1	C; 01103 1	00004 0	30002 0	55363 1	04760 1	C; 00310 0
4750	00004 0	34754 0	56006 1	12007 0	C; 16063 0	00004 0	30002 0	55363 1
4760	30002 0	30000 1	54001 1	30006 1	55364 0	30002 0	54073 1	11360 1
4770	14773 1	23360 0	15005 0	11361 0	14777 0	23361 1	15010 1	31362 1

OCTAL LISTING OF PARAGRAPH # 012, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

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5000   77743 1   10000 0   15020 1   23362 1   15010 1   40326 1   76006 0   26326 1
5010   35660 1   05505 1   C; 02103 1   C; 16062 1   56073 0   00003 1   50000 1   00001 0
5020   30001 0   67745 0   57362 1   77743 1   55361 0   15014 0   00004 0   00006 1
5030   00004 0   54001 1   00006 1   06004 0   00006 1   15041 0   00006 1   00004 0

5040   54001 1   47743 1   60001 0   00006 1   15027 0   00006 1   00003 1   00002 0
5050   C; 02000 0   C; 34062 1   50002 0   30000 1   24002 0   22002 0   05063 1   22002 0
5060   50002 0   30000 1   24002 0   67745 0   51143 0   55133 0   11143 1   15071 0
5070   37765 1   55143 1   00002 0   50002 0   30000 1   24002 0   22002 0   05063 1

5100   15102 0   00006 1   23146 0   30006 1   55147 0   00006 1   51146 0   30001 0
5110   05063 1   23150 1   04161 0   C; 47012 1   C; 76627 0   C; 05123 1   C; 04062 1   31150 1
5120   05704 1   51146 0   00002 0   31147 1   54006 0   05121 0   00004 0   50002 0
5130   40000 0   67761 0   54070 1   50000 1   11170 1   15144 1   15144 1   15144 1

5140   50002 0   30001 0   50070 0   55170 1   50070 0   11164 1   67763 1   15155 1
5150   15146 0   50002 0   30002 0   50000 1   30000 1   50070 0   55164 1   36311 1
5160   60002 0   55207 1   30076 0   77757 1   10000 0   15202 0   15171 1   04736 1
5170   04736 1   06060 1   C; 00020 0   00004 0   35204 1   55201 1   37763 1   05663 1

5200   C; 02000 0   C; 62062 1   00003 1   01207 0   C; 01033 0   C; 00145 1   52124 1   50002 0
5210   30000 1   24002 0   54001 1   22004 0   75337 1   56002 0   52124 1   50002 0
5220   02000 0   56124 0   56004 0   56124 0   00123 1   56002 0   50000 1   30000 1
5230   54004 1   75337 1   56002 0   50002 0   12000 1   35337 0   70123 0   60124 0

5240   00002 0   54001 1   00006 1   00007 0   56001 0   54125 0   56004 0   00006 1
5250   04007 1   56125 1   75337 1   56001 0   00004 0   00006 1   01007 1   50001 0
5260   32000 0   56125 1   00006 1   01007 1   00003 1   54004 1   30125 1   00002 0
5270   52073 1   50002 0   30000 1   24002 0   54001 1   22004 0   75337 1   56002 0

5300   52073 1   50002 0   02000 0   56073 0   56004 0   56073 0   00072 1   56002 0
5310   54154 0   30006 1   54155 1   37754 0   54023 1   30002 0   00154 1   54154 0
5320   37754 0   54023 1   30006 1   54155 1   50002 0   30000 1   54004 1   75337 1
5330   56002 0   56154 1   15233 1   00006 1   01007 1   00002 0   C; 77775 1   C; 01777 1

5340   C; 77774 0   C; 00777 0   C; 00177 0   C; 00017 1   C; 00032 0   C; 40014 0   C; 40015 1   C; 00112 0
5350   C; 00060 1   C; 74000 1   C; 01400 1   C; 00055 1   67746 0   55130 0   15360 0   41130 0
5360   60000 1   55130 0   15373 1   57130 1   51130 1   67744 1   40000 0   61130 1
5370   55130 0   15373 1   15411 1   00006 1   71130 0   55131 1   00006 1   75416 0
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OCTAL LISTING OF PARAGRAPH # 013, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

5400	65415 1	00006 1	71131 1	65414 0	00006 1	71130 0	20001 1	55130 0
5410	00002 0	50000 1	47744 0	00002 0	C; 31103 1	C; 65552 0	C; 01124 1	55132 1
5420	10000 0	15425 0	00002 0	24002 0	00002 0	00006 1	23131 0	65504 0
5430	54000 0	15473 0	57132 0	55132 1	54021 0	56021 1	55130 0	65502 0
5440	10000 0	65503 1	05447 0	15444 1	37751 0	61132 0	60000 1	05462 1
5450	05462 1	57131 0	10000 0	57131 0	05460 0	57131 0	00006 1	77750 0
5460	51131 0	00001 0	56021 1	41130 0	22007 0	00006 1	10021 0	56021 1
5470	00006 1	60021 1	00002 0	41131 1	55131 1	37755 1	00006 1	71132 1
5500	30001 0	05433 0	C; 73777 1	C; 24001 0	C; 37401 0	54063 0	00006 1	50002 0
5510	30001 0	52066 0	35575 0	56004 0	54061 1	13105 1	54063 0	00006 1
5520	50002 0	30001 0	52066 0	35575 0	56004 0	13063 0	56002 0	65336 1
5530	56002 0	15522 0	35575 0	54001 1	30002 0	22006 1	00004 0	13163 1
5540	35575 0	54006 0	40154 0	22155 0	15536 0	54154 0	35575 0	54004 1
5550	13244 1	54065 0	47762 1	26002 1	35575 0	56004 0	13255 1	00004 0
5560	54063 0	35575 0	56006 1	54155 1	30002 0	13324 0	04724 1	35575 0
5570	54004 1	13335 0	30061 0	54004 1	17017 1	C; 03063 1	47767 1	54067 1
5600	00003 1	47762 1	00006 1	03011 1	15607 1	00006 1	23354 1	10067 1
5610	15622 0	37762 0	15616 1	35631 0	54006 0	01354 1	00006 1	05011 1
5620	52155 1	52006 0	37762 0	00006 1	05011 1	35575 0	54004 1	00004 0
5630	13162 0	C; 76062 1	C; 03000 1	C; 05000 1	C; 06000 1	C; 07000 0	C; 11000 1	C; 13000 0
5640	C; 14000 1	C; 15000 0	C; 16000 0	C; 17000 1	C; 21000 1	C; 22000 1	C; 23000 0	C; 25000 0
5650	C; 26000 0	C; 27000 1	C; 31000 0	C; 32000 0	C; 33000 1	C; 34000 0	C; 35000 1	C; 36000 1
5660	C; 37000 0	C; 02400 1	C; 03400 0	56002 0	54061 1	00006 1	50000 1	30001 0
5670	54063 0	35700 0	56006 1	13427 1	30062 0	54006 0	50061 0	00002 0
5700	C; 02063 0	50002 0	30000 1	24002 0	56002 0	54063 0	30006 1	54001 1
5710	35713 1	54061 1	15671 0	15725 0	C; 72061 0	C; 73714 1	10076 1	15727 1
5720	15727 1	15722 1	35656 1	05505 1	C; 03501 0	C; 24063 1	15727 1	11076 0
5730	35700 0	54006 0	13602 1	00006 1	22012 1	30016 0	56006 1	52011 0
5740	50017 1	53154 1	00006 1	50002 0	30001 0	53152 1	00006 1	35752 1
5750	52006 0	C; 03634 0	C; 02063 0	C; 05753 0	C; 05754 1	CKSM 67476 0	@	@
5760	@	@	@	@	@	@	@	@
5770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 014, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

6000	00004 0	30002 0	55363 1	50002 0	30000 1	04762 0	C; 40400 1	47150 0
6010	70075 1	54075 1	16012 0	10031 1	00002 0	00002 0	00002 0	37743 0
6020	00006 1	03013 0	37767 0	57003 0	57002 1	54031 1	10031 1	16032 1
6030	31004 1	16041 0	37745 0	00006 1	05013 0	37767 0	57006 0	57005 0
6040	57004 1	00006 1	66046 0	00006 1	01006 0	00002 0	00006 1	01005 0
6050	00002 0	00004 0	40075 1	50002 0	70000 0	26075 1	00003 1	17015 0
6060	00004 0	40076 1	50002 0	70000 0	26076 1	00003 1	17015 0	50002 0
6070	40000 0	00004 0	70075 1	54075 1	00003 1	17015 0	50002 0	40000 0
6100	00004 0	70076 1	54076 1	00003 1	17015 0	C; 02327 0	C; 02237 0	C; 00133 0
6110	C; 00033 1	C; 00707 1	00006 1	22154 1	30006 1	54155 1	77745 1	54105 1
6120	54023 1	16134 0	22006 1	16114 1	54153 1	30155 0	54006 0	10023 1
6130	16143 0	10067 1	15540 1	24154 1	50154 1	30000 1	10000 0	16431 0
6140	04736 1	54023 1	75342 0	54020 1	10020 1	16313 1	17021 1	77763 0
6150	10000 0	16212 1	50154 1	40001 1	10000 0	16261 0	C; 77773 1	24154 1
6160	54106 1	66315 0	10000 0	66342 1	16171 1	30110 1	26106 1	50020 0
6170	76342 0	00006 1	66202 1	75337 1	65337 0	56106 0	60105 0	54004 1
6200	50020 0	76342 0	74564 0	65352 0	56106 0	54003 0	50020 0	76342 0
6210	35346 0	54020 1	30110 1	54120 0	24154 1	50154 1	40000 0	10000 0
6220	24120 1	16222 1	54106 1	75351 1	00006 1	16230 1	30105 0	26106 1
6230	50120 1	40046 1	26106 1	76340 1	00006 1	16250 1	75351 1	00006 1
6240	16252 0	30106 0	54004 1	75337 1	67751 0	54106 1	50020 0	36342 1
6250	30110 1	16256 1	35352 0	56106 0	54003 0	74564 0	26106 1	50020 0
6260	36342 1	34565 0	10020 1	66266 0	10000 0	16277 1	C; 77767 1	66156 0
6270	10000 0	50000 1	46310 1	16301 1	50153 0	46306 0	16301 1	50153 0
6300	46310 1	26156 1	54106 1	50020 0	76342 0	C; 00002 0	C; 00006 1	C; 00006 1
6310	C; 00002 0	C; 00003 1	C; 00006 1	10020 1	16327 0	C; 77722 0	24154 1	50154 1
6320	30000 1	54107 0	36337 0	54004 1	70020 1	50000 1	16403 1	54004 1
6330	10020 1	50000 1	12000 1	10153 1	12017 1	12017 1	12121 0	C; 02177 1
6340	C; 77700 0	C; 76000 0	C; 74056 1	16563 0	17142 0	17707 1	17460 0	16761 0
6350	16546 1	16537 1	17656 1	16557 1	16676 1	16601 1	17413 1	16635 0
6360	16704 0	17416 1	17650 1	17626 0	17631 0	17635 1	17653 1	17025 0
6370	17053 1	17103 0	17410 1	17540 0	17504 0	17071 1	17127 0	17043 0

OCTAL LISTING OF PARAGRAPH # 015, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

6400	16400 1	17624 1	17645 0	12626 0	12633 1	12636 1	12642 1	12646 0
6410	12654 0	12670 0	12677 1	12662 0	12673 0	12751 1	12756 0	12731 1
6420	12771 0	13000 0	12741 0	30155 0	54004 1	24154 1	50154 1	40000 0
6430	67771 1	54106 1	74563 1	56106 0	75655 0	00006 1	77757 1	50000 1
6440	16441 1	06471 0	16133 1	06463 0	16133 1	06466 0	16133 1	06471 0
6450	16527 0	06471 0	16210 0	06471 0	16532 1	06471 0	16535 0	06471 0
6460	35344 1	54020 1	16316 1	50110 1	40046 1	16470 0	50110 1	40047 0
6470	26106 1	40106 1	65353 1	10000 0	30110 1	16502 1	35352 0	56106 0
6500	54003 0	74564 0	26106 1	00006 1	30145 1	50106 0	52001 1	10153 1
6510	16523 1	00002 0	00006 1	30150 0	50106 0	52003 0	00006 1	30152 1
6520	50106 0	52005 0	00002 0	30146 1	50106 0	54002 1	00002 0	35345 0
6530	54020 1	16152 0	37745 0	54020 1	16152 0	36153 0	16211 1	00006 1
6540	50106 0	30001 0	52145 0	37767 0	54146 0	16124 1	50106 0	30002 0
6550	54146 0	00006 1	50106 0	30001 0	52145 0	37763 1	16124 1	22007 0
6560	50106 0	30000 1	16542 0	00006 1	50106 0	30001 0	52145 0	00006 1
6570	50106 0	30003 1	52150 1	00006 1	50106 0	30005 1	52152 0	47763 0
6600	16124 1	00006 1	50106 0	30001 0	52145 0	50156 0	52001 1	50153 0
6610	36310 0	26156 1	10153 1	16630 0	16626 1	54153 1	54146 0	52150 1
6620	50156 0	51775 0	52152 0	50156 0	51777 1	16125 0	54146 0	16125 0
6630	54153 1	56146 1	50156 0	53777 0	16125 0	00006 1	50106 0	30001 0
6640	52145 0	50156 0	52001 1	50153 0	36310 0	26156 1	10153 1	16666 0
6650	16567 1	00006 1	50106 0	30003 1	52150 1	50156 0	51775 0	00006 1
6660	50106 0	30005 1	52152 0	50156 0	51777 1	16125 0	00006 1	50106 0
6670	30003 1	52150 1	30146 1	50156 0	53777 0	16573 1	24154 1	50154 1
6700	30000 1	50106 0	54000 0	16125 0	24154 1	50154 1	30000 1	50106 0
6710	60000 1	54004 1	75337 1	50000 1	32000 0	54107 0	30155 0	76341 0
6720	66341 1	60154 1	50110 1	54052 1	30107 1	75351 1	00006 1	16740 0
6730	30155 0	54006 0	30107 1	54004 1	75337 1	67751 0	54154 0	16114 1
6740	30107 1	66315 0	10000 0	30107 1	16753 1	30110 1	60107 1	50000 1
6750	30000 1	54107 0	16725 0	54003 0	74564 0	50000 1	31400 1	54107 0
6760	16725 0	50154 1	30001 0	50106 0	60000 1	54004 1	75337 1	50000 1
6770	32000 0	54107 0	16725 0	30155 0	54004 1	50154 1	30001 0	54107 0

OCTAL LISTING OF PARAGRAPH # 016, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

7000	16725 0	10144 1	00002 0	17005 1	17017 1	10145 0	00002 0	17011 1
7010	17017 1	10146 0	00002 0	17015 0	17017 1	50002 0	00001 0	50002 0
7020	00002 0	30155 0	54006 0	50154 1	00001 0	00006 1	50106 0	30003 1
7030	20150 1	00006 1	17034 0	07101 0	00006 1	50106 0	30005 1	20152 0
7040	00006 1	17043 0	07101 0	00006 1	50106 0	30001 0	20145 0	00006 1
7050	16125 0	07101 0	16125 0	00006 1	50106 0	40003 0	20150 1	00006 1
7060	17062 0	07101 0	00006 1	50106 0	40005 0	20152 0	00006 1	17071 1
7070	07101 0	00006 1	50106 0	40001 1	20145 0	00006 1	16125 0	07101 0
7100	16125 0	37763 1	17224 0	00006 1	50106 0	30003 1	52150 1	00006 1
7110	40001 1	20150 1	00006 1	17115 1	07101 0	00006 1	50106 0	30005 1
7120	52152 0	00006 1	40001 1	20152 0	00006 1	17127 0	07101 0	00006 1
7130	50106 0	30001 0	52145 0	00006 1	40001 1	20145 0	00006 1	16125 0
7140	07101 0	16125 0	00006 1	50106 0	30002 0	20146 0	50106 0	60000 1
7150	60144 0	54144 1	16125 0	54111 1	16125 0	50002 0	30000 1	24002 0
7160	54106 1	50106 0	30001 0	54146 0	37767 0	56145 1	54125 0	00006 1
7170	70146 0	56146 1	00006 1	70144 1	20146 0	50106 0	30000 1	56125 1
7200	00006 1	70125 0	20146 0	56144 0	00006 1	70125 0	20145 0	00002 0
7210	37767 0	54153 1	56146 1	60000 1	54001 1	00002 0	60145 1	54145 0
7220	00002 0	60144 0	54144 1	00002 0	54111 1	00002 0	37762 0	54126 0
7230	00006 1	22127 0	07161 0	52150 1	52145 0	52121 1	30146 1	54122 1
7240	30126 1	26106 1	07161 0	52146 0	20122 1	60144 0	60120 1	54120 0
7250	17252 1	54111 1	52152 0	52145 0	30126 1	26106 1	07161 0	52122 1
7260	20146 0	60144 0	60120 1	54144 1	00127 0	54111 1	00127 0	00006 1
7270	22131 1	54107 0	22130 0	17304 0	50002 0	30000 1	54130 1	60000 1
7300	60002 0	54107 0	67766 1	54131 0	35347 1	54106 1	00006 1	50107 1
7310	30004 0	52145 0	52113 0	17317 1	54130 1	47762 1	26107 0	07161 0
7320	00006 1	50107 1	30002 0	20145 0	10130 1	17314 1	00131 1	22002 0
7330	07001 1	17335 1	17355 1	47743 1	17336 1	37743 0	54002 1	00006 1
7340	24000 1	60146 1	54146 0	37767 0	60002 0	60145 1	54145 0	37767 0
7350	60002 0	60144 0	54144 1	54145 0	00001 0	54146 0	17352 0	54125 0
7360	00006 1	70146 0	54146 0	37767 0	56145 1	00006 1	70125 0	20146 0
7370	56144 0	00006 1	70125 0	20145 0	00002 0	54125 0	00006 1	70145 0

OCTAL LISTING OF PARAGRAPH # 017; WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

7400	52145 0	00006 1	70125 0	30001 0	26144 1	00006 1	30145 1	00002 0
7410	07226 0	37767 0	16124 1	37762 0	54130 1	17421 0	44570 0	54130 1
7420	36306 1	54126 0	07612 0	07230 1	00006 1	30113 1	52145 0	52124 1
7430	00006 1	30115 1	52150 1	00006 1	30117 0	52152 0	30130 0	26106 1
7440	07230 1	52113 0	52145 0	52115 0	52150 1	52117 1	52152 0	30130 0
7450	26106 1	07230 1	52124 1	52145 0	52152 0	52115 0	52150 1	16125 0
7460	10153 1	17507 0	17507 0	07161 0	07212 1	52150 1	52145 0	52150 1
7470	07161 0	07212 1	52152 0	52145 0	52152 0	07161 0	07212 1	52145 0
7500	52152 0	52150 1	52145 0	16125 0	07226 0	47761 1	26106 1	00006 1
7510	30145 1	52150 1	07161 0	07212 1	37762 0	26106 1	00006 1	30150 0
7520	52145 0	52152 0	07161 0	07212 1	37762 0	26106 1	52150 1	52145 0
7530	52150 1	07161 0	07212 1	52145 0	52152 0	52145 0	47763 0	16124 1
7540	00006 1	30152 1	52145 0	52113 0	07161 0	00006 1	40150 1	52145 0
7550	52115 0	07161 0	37762 0	26106 1	00006 1	40152 0	52145 0	52152 0
7560	07161 0	00006 1	30113 1	52145 0	52117 1	07161 0	37762 0	26106 1
7570	00006 1	40113 0	52145 0	20152 0	00006 1	17577 1	07101 0	07161 0
7600	52115 0	52150 1	52145 0	20150 1	00006 1	17607 0	07101 0	07161 0
7610	52117 1	17046 0	00006 1	30145 1	52113 0	00006 1	30150 0	52115 0
7620	00006 1	30152 1	52117 1	00002 0	07161 0	16125 0	07161 0	07211 1
7630	16125 0	00006 1	50106 0	30001 0	17641 1	00006 1	50106 0	30001 0
7640	52145 0	52121 1	37767 0	54004 1	12352 0	30106 0	54156 1	16127 1
7650	37767 0	54004 1	12172 0	35342 1	54004 1	12214 0	10153 1	17670 0
7660	17670 0	00006 1	50106 0	30001 0	52121 1	37767 0	54004 1	12630 1
7670	00006 1	50106 0	30003 1	52150 1	00006 1	50106 0	30005 1	52152 0
7700	47763 0	54153 1	00006 1	50106 0	30001 0	52145 0	17664 0	50106 0
7710	10000 0	16125 0	17714 0	17722 0	50106 0	10001 1	16125 0	16125 0
7720	17722 0	16125 0	00006 1	40145 0	52145 0	10153 1	17737 1	17737 1
7730	00006 1	40150 1	52150 1	00006 1	40152 0	52152 0	16125 0	40146 0
7740	54146 0	16125 0	C; 37777 1	C; 37777 1	C; 37777 1	C; 40000 0	C; 20000 0	C; 10000 0
7750	C; 04000 0	C; 02000 0	C; 01000 0	C; 00400 0	C; 00200 0	C; 00100 0	C; 00040 0	C; 00020 0
7760	C; 00010 0	C; 00004 0	C; 00002 0	C; 00001 0	C; 00013 0	C; 00007 0	C; 00005 1	C; 00000 1
7770	C; 77777 0	C; 77776 1	C; 07772 1	C; 07773 0	CKSM 41016 0	@	@	@

OCTAL LISTING OF PARAGRAPH # 020, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

00,2000	13167 0	13511 0	13500 0	13571 0	13573 1	13154 0	12116 1	17722 0
00,2010	13212 1	13002 1	13156 1	13226 0	16423 0	13256 1	13231 0	36306 1
00,2020	70020 1	54021 0	10020 1	12101 1	C; 00024 1	50021 1	37746 0	54125 0
00,2030	10020 1	02050 0	16124 1	30125 1	00006 1	70146 0	54146 0	30125 1
00,2040	00006 1	70144 1	52145 0	30125 1	00006 1	70001 1	20146 0	16125 0
00,2050	30146 1	00006 1	70125 0	56145 1	00006 1	70125 0	56145 1	60001 0
00,2060	60000 1	54146 0	12064 0	26145 0	37767 0	54146 0	56144 0	00006 1
00,2070	70125 0	20145 0	00002 0	30125 1	00006 1	70145 0	54145 0	56001 0
00,2100	12060 1	30021 1	54125 0	00006 1	30146 1	20146 0	60144 0	60144 0
00,2110	54144 1	12113 1	54111 1	10125 0	12102 1	10020 1	07210 0	16125 0
00,2120	16125 0	37765 1	70020 1	54125 0	10020 1	12145 1	C; 00176 1	50125 1
00,2130	37746 0	54125 0	02073 1	52145 0	52150 1	52145 0	02073 1	52145 0
00,2140	52152 0	52145 0	02073 1	17477 0	54125 0	00006 1	30145 1	20145 0
00,2150	00006 1	12153 0	07101 0	00006 1	30150 0	20150 1	00006 1	12161 1
00,2160	07101 0	00006 1	30152 1	20152 0	00006 1	12167 1	07101 0	10125 0
00,2170	12144 0	16125 0	54125 0	07001 1	12176 1	12212 0	07327 0	30144 0
00,2200	12207 1	24125 1	00006 1	30146 1	20146 0	60144 0	26144 1	60000 1
00,2210	54000 0	12201 1	40125 0	16701 0	70106 1	10000 0	12224 0	37752 0
00,2220	70106 1	10000 0	07210 0	16125 0	54125 0	37754 0	00006 1	70106 1
00,2230	76311 0	50000 1	12233 0	12332 0	12341 1	12336 1	10153 1	12277 0
00,2240	12277 0	30125 1	63710 1	00006 1	62127 1	67771 1	54125 0	37767 0
00,2250	54001 1	56144 0	56145 1	02272 1	20145 0	56147 0	56150 0	02272 1
00,2260	20150 1	56151 1	56152 1	02272 1	20152 0	10125 0	54125 0	12242 0
00,2270	C; 04604 1	16125 0	60000 1	54146 0	37767 0	56001 0	00002 0	30125 1
00,2300	63710 1	00006 1	62322 0	67771 1	54125 0	37767 0	56144 0	56145 1
00,2310	54146 0	10125 0	54125 0	02300 0	C; 22650 1	37752 0	70106 1	10000 0
00,2320	07210 0	16125 0	50125 1	37746 0	54125 0	37752 0	70106 1	10000 0
00,2330	12031 0	12033 1	40125 0	62126 0	54125 0	12236 0	40125 0	62126 0
00,2340	54125 0	10153 1	12345 0	12345 0	12145 1	37756 1	00006 1	70106 1
00,2350	54020 1	12103 0	47763 0	54126 0	54127 1	54130 1	10120 0	13712 1
00,2360	12362 0	13725 0	54146 0	07327 0	10144 1	12412 0	12370 0	12411 0
00,2370	56121 0	56120 1	56145 1	56144 0	10120 0	12420 1	12400 0	12414 0

OCTAL LISTING OF PARAGRAPH # 021, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

00,2400	40144 1	00006 1	62404 0	24126 1	37743 0	54144 1	02604 1	37763 1
00,2410	17153 0	24126 1	40121 1	12401 1	00006 1	40121 1	52121 1	24126 1
00,2420	10144 1	12435 0	12424 0	12431 1	10145 0	12435 0	16125 0	12431 1
00,2430	16125 0	00006 1	40145 0	52145 0	24126 1	40144 1	67771 1	60120 1
00,2440	10000 0	12503 1	C; 60001 0	12444 0	37746 0	60000 1	60145 1	54145 0
00,2450	37767 0	67743 0	26144 1	37746 0	60000 1	60121 0	54121 1	37767 0
00,2460	67743 0	26120 0	40144 1	60120 1	10000 0	12503 1	C; 00123 1	12404 1
00,2470	54130 1	40145 0	60121 0	00006 1	62404 0	12503 1	00006 1	24127 0
00,2500	00006 1	30121 0	20121 1	30120 1	60000 1	54000 0	12476 1	52145 0
00,2510	50127 0	02541 0	54146 0	16125 0	22021 1	00006 1	77746 1	56001 0
00,2520	60021 1	56001 0	12545 0	20001 1	20001 1	20001 1	20001 1	20001 1
00,2530	20001 1	20001 1	20001 1	20001 1	20001 1	20001 1	20001 1	20001 1
00,2540	52145 0	10130 1	C; 06552 0	12616 0	52145 0	00006 1	10120 0	52145 0
00,2550	40144 1	00006 1	70121 1	60145 1	54000 0	12562 0	00006 1	60120 1
00,2560	24144 0	12564 0	00006 1	62574 0	00006 1	60120 1	00006 1	12572 1
00,2570	00006 1	62600 0	24144 0	12601 0	00006 1	12604 0	00006 1	26144 1
00,2600	60120 1	22007 0	00006 1	10120 0	54145 0	10126 0	00002 0	00002 0
00,2610	00002 0	00006 1	40145 0	52145 0	37767 0	00002 0	40144 1	60120 1
00,2620	00006 1	12623 0	12544 1	37743 0	54144 1	40121 1	60145 1	12600 1
00,2630	47763 0	54127 1	54117 1	10120 0	12671 1	12637 0	12665 1	56121 0
00,2640	56120 1	56145 1	56144 0	00006 1	12646 0	12404 1	56150 0	56147 0
00,2650	00006 1	12653 1	12404 1	56152 1	56151 1	00006 1	12660 1	12404 1
00,2660	10120 0	12671 1	12404 1	12665 1	12404 1	00006 1	40121 1	52121 1
00,2670	24117 0	37746 0	60000 1	60121 0	54121 1	37767 0	67743 0	26120 0
00,2700	56123 1	30121 0	54124 1	12711 0	00006 1	24127 0	00006 1	30121 0
00,2710	20121 1	30120 1	60000 1	54000 0	12704 1	02727 1	52150 1	52145 0
00,2720	52150 1	02727 1	52152 0	52145 0	52152 0	02727 1	17477 0	30117 0
00,2730	54126 0	10144 1	12746 1	12735 0	12742 0	10145 0	12746 1	00002 0
00,2740	12742 0	00002 0	00006 1	40145 0	52145 0	24126 1	47763 0	54130 1
00,2750	40144 1	60123 1	00006 1	62757 0	52145 0	50127 0	12541 1	37746 0
00,2760	60000 1	60145 1	54145 0	37767 0	67743 0	26144 1	40144 1	60123 1
00,2770	10000 0	12754 1	C; 52506 0	12404 1	54130 1	40145 0	60124 0	00006 1

OCTAL LISTING OF PARAGRAPH # 022, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

00,3000	62404 0	12754 1	07612 0	37767 0	56111 0	54131 0	03301 0	30131 1
00,3010	56111 0	00006 1	13014 0	12404 1	00006 1	30145 1	50110 1	52043 1
00,3020	03325 0	10144 1	13027 0	54001 1	50110 1	52045 1	12404 1	43130 1
00,3030	60125 1	10000 0	40000 0	13111 1	13043 1	43127 1	54125 0	30144 0
00,3040	54001 1	37767 0	13070 1	10125 0	13052 1	42024 1	54125 0	00006 1
00,3050	30145 1	13070 1	40000 0	54125 0	40000 0	50000 1	37746 0	54120 0
00,3060	00006 1	70145 0	56120 1	00006 1	70144 1	56001 0	60120 1	56001 0
00,3070	50110 1	52045 1	47763 0	54130 1	52113 0	52145 0	52121 1	03131 1
00,3100	52115 0	52145 0	52150 1	03131 1	52117 1	52145 0	52152 0	03131 1
00,3110	17477 0	54125 0	37767 0	56113 1	56112 0	56115 1	56114 0	56117 0
00,3120	56116 1	40125 0	50000 1	37746 0	00006 1	70144 1	13040 1	C; 00015 0
00,3130	C; 00016 0	10144 1	13150 1	13135 1	13142 1	10145 0	13150 1	00002 0
00,3140	13142 1	00002 0	47767 1	54126 0	00006 1	40145 0	50125 1	12540 0
00,3150	54126 0	52145 0	50125 1	12540 0	03262 1	16125 0	10153 1	13206 1
00,3160	13206 1	03301 0	22153 0	00006 1	30145 1	50110 1	52043 1	03325 0
00,3170	10125 0	13173 0	16125 0	63710 1	00006 1	63201 1	22007 0	22106 0
00,3200	12303 1	50125 1	37745 0	54125 0	37767 0	12036 1	07001 1	16125 0
00,3210	16125 0	17722 0	47761 1	26156 1	00006 1	50000 1	30003 1	52150 1
00,3220	00006 1	50156 0	30001 0	52152 0	47763 0	16124 1	03301 0	37767 0
00,3230	16124 1	00006 1	30145 1	50156 0	52001 1	50153 0	36310 0	26156 1
00,3240	10153 1	13254 0	16125 0	00006 1	30150 0	50156 0	51775 0	00006 1
00,3250	30152 1	50156 0	51777 1	16125 0	30146 1	16632 1	50110 1	30052 0
00,3260	54107 0	16730 1	30145 1	00006 1	70000 0	54146 0	37767 0	56145 1
00,3270	00006 1	70144 1	20001 1	20146 0	56144 0	00006 1	70000 0	20145 0
00,3300	00002 0	00006 1	22127 0	03262 1	52150 1	52145 0	52121 1	30146 1
00,3310	54122 1	03262 1	52146 0	20122 1	60144 0	60120 1	54120 0	13321 0
00,3320	54111 1	52152 0	52145 0	03262 1	17257 1	37767 0	54125 0	10144 1
00,3330	13366 0	13333 0	13355 0	56146 1	56145 1	54144 1	37765 1	54125 0
00,3340	10144 1	13366 0	13344 0	13360 0	56145 1	54144 1	37765 1	26125 0
00,3350	10144 1	13366 0	00002 0	13360 0	13434 0	10000 0	13364 1	10145 0
00,3360	37767 0	13434 0	13364 1	13434 0	06000 1	C; 01302 1	62442 1	00006 1
00,3370	63437 1	52145 0	22021 1	00006 1	77746 1	52145 0	56021 1	26145 0

OCTAL LISTING OF PARAGRAPH # 023. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

00,3400	32314 0	00006 1	70144 1	62542 0	54120 0	30144 0	22007 0	00006 1
00,3410	10120 0	00006 1	77746 1	26120 0	00006 1	77746 1	52145 0	00006 1
00,3420	10120 0	54121 1	37767 0	56001 0	00006 1	10120 0	54001 1	30121 0
00,3430	20145 0	00006 1	13436 1	37743 0	54144 1	54145 0	00002 0	67747 1
00,3440	00006 1	63463 0	52145 0	22021 1	00006 1	77746 1	52145 0	56021 1
00,3450	26145 0	32772 1	00006 1	70144 1	62270 0	13404 0	00006 1	30146 1
00,3460	20146 0	60144 0	26144 1	24125 1	00006 1	30146 1	20146 0	60144 0
00,3470	26144 1	60000 1	54022 0	10022 0	10022 0	13456 1	13400 1	13451 0
00,3500	07001 1	13504 1	13507 1	13507 1	00006 1	40145 0	52145 0	37747 1
00,3510	26144 1	52145 0	20001 1	54000 0	13517 0	00006 1	40001 1	52145 0
00,3520	30144 0	60000 1	54001 1	13534 1	50000 1	37745 0	60000 1	00006 1
00,3530	60144 0	54144 1	40145 0	54145 0	00006 1	30145 1	52124 1	03262 1
00,3540	07274 1	C; 00003 1	C; 14441 0	C; 37325 1	C; 53250 0	C; 60764 1	C; 12146 1	C; 21276 1
00,3550	C; 75466 1	C; 71471 0	C; 00236 0	C; 32757 0	32466 1	07160 1	00006 1	30146 1
00,3560	20146 0	60144 0	26144 1	00006 1	30146 1	20146 0	60144 0	26144 1
00,3570	16125 0	33612 1	13574 0	33674 1	54126 0	07001 1	13606 0	13706 1
00,3600	00006 1	40145 0	52145 0	33711 0	56126 1	54127 1	47746 1	60144 0
00,3610	10000 0	13702 0	13670 1	13623 1	10145 0	37767 0	13620 1	13623 1
00,3620	54145 0	54144 1	00126 1	00006 1	40145 0	67746 0	52145 0	52124 1
00,3630	03325 0	10125 0	13675 1	52145 0	52124 1	52145 0	07674 1	C; 00006 1
00,3640	C; 13240 0	C; 23630 0	C; 74721 0	C; 47775 1	C; 02440 0	C; 20237 0	C; 75067 1	C; 70742 1
00,3650	C; 03436 0	C; 26756 1	C; 74037 0	C; 57640 1	C; 03046 0	C; 07143 0	C; 76654 1	C; 42244 0
00,3660	32466 1	07160 1	00126 1	00006 1	40145 0	67746 0	52145 0	00127 0
00,3670	00006 1	40145 0	67747 1	52145 0	16125 0	50000 1	37746 0	54125 0
00,3700	02073 1	13633 0	00006 1	13620 1	06000 1	C; 01301 1	37747 1	13621 0
00,3710	C; 77763 0	13663 0	10000 0	12420 1	40121 1	00006 1	62420 0	37746 0
00,3720	60000 1	26121 1	37767 0	54120 0	12362 0	10000 0	12414 0	30121 0
00,3730	00006 1	62414 1	47746 1	13720 0	C; 03734 1	C; 03735 0	CKSM 55262 1	@
00,3740	@	@	@	@	@	@	@	@
00,3750	@	@	@	@	@	@	@	@
00,3760	@	@	@	@	@	@	@	@
00,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 024, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

01,2000	00004 0	02357 1	12007 0	37746 0	05516 0	C; 03546 0	C; 72060 1	37745 0	
01,2010	54326 1	47767 1	55127 0	54055 0	55345 0	55162 1	35661 0	54001 1	
01,2020	22003 1	37767 0	55534 0	55535 1	22003 1	55163 0	54101 0	54102 0	
01,2030	54103 1	55356 1	55360 1	55361 0	55362 0	37762 0	55337 0	55340 0	
01,2040	37743 0	55336 1	47767 1	55164 1	55165 0	55166 0	55167 1	55170 1	
01,2050	55171 0	55172 0	55173 1	47763 0	55145 1	37761 0	54001 1	50001 0	
01,2060	32576 1	50001 0	54074 0	10001 1	12056 1	55355 1	55353 1	55133 0	
01,2070	55134 1	55135 0	55136 0	55137 1	55140 1	55141 0	55142 0	55143 1	
01,2100	55144 0	00006 1	01005 0	00006 1	01006 0	32570 1	54365 0	37752 0	
01,2110	05663 1	C; 02273 0	C; 26063 0	00006 1	32606 0	53001 0	34276 0	54346 1	
01,2120	32554 1	54001 1	22003 1	32553 0	55401 1	32556 0	55405 0	32557 1	
01,2130	55404 1	22003 1	02151 0	00003 1	12135 0	00004 0	05270 1	C; 40315 1	
01,2140	37767 0	54302 1	54764 0	00003 1	05206 0	C; 12001 0	06051 0	C; 04000 0	
01,2150	15600 0	37764 0	54120 0	47767 1	22007 0	50120 1	53077 1	10120 0	
01,2160	10000 0	12152 1	00002 0	25356 0	22002 0	53775 1	02357 1	37745 0	
01,2170	00006 1	03033 1	00006 1	12201 1	37746 0	00006 1	02033 0	00006 1	
01,2200	12042 1	00006 1	00015 0	62565 0	00006 1	12207 1	12215 1	37757 0	
01,2210	00006 1	02016 1	62566 0	00006 1	12042 1	31353 0	00006 1	12221 0	
01,2220	12042 1	32574 0	70326 1	67745 0	56326 0	77760 0	00006 1	05012 1	
01,2230	32571 0	70365 0	62572 0	54365 0	00006 1	32604 1	53001 0	35660 1	
01,2240	05505 1	C; 02106 1	C; 16063 0	40346 1	62561 1	00006 1	12255 0	11145 1	
01,2250	67763 1	55144 0	47763 0	55145 1	12262 1	51144 1	41133 0	77745 1	
01,2260	51144 1	27133 0	34276 0	54346 1	37760 1	00006 1	05014 1	37750 1	
01,2270	70075 1	10000 0	12275 1	05225 1	C; 16000 0	00003 1	12277 0	00004 0	
01,2300	37766 1	54151 0	60000 1	00006 1	50000 1	31100 1	00006 1	06001 0	
01,2310	10000 0	12347 1	12347 1	12347 1	10151 0	12301 0	54152 0	37766 1	
01,2320	54151 0	60000 1	50000 1	11100 0	12326 0	12333 1	54144 1	24144 0	
01,2330	24152 1	32353 0	05212 0	10151 0	12320 0	10152 0	12143 1	04755 1	
01,2340	C; 01110 0	40075 1	77750 0	10000 0	12607 0	54302 1	12143 1	04755 1	
01,2350	C; 01107 0	00004 0	12042 1	C; 14377 1	00004 0	02374 0	12275 1	37767 0	
01,2360	00006 1	01005 0	00006 1	01006 0	00006 1	01012 0	37743 0	54026 1	
01,2370	65336 1	54027 0	67771 1	54030 0	37767 0	00006 1	01007 1	00006 1	

OCTAL LISTING OF PARAGRAPH # 025, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

01,2400	01011 0	00006 1	01014 0	32567 1	00006 1	03012 1	35655 1	00006 1
01,2410	01013 1	32564 1	54003 0	37744 1	55407 1	55406 0	55405 0	55404 1
01,2420	55403 0	55402 1	55401 1	55400 0	45714 1	55410 1	55412 0	55414 0
01,2430	55416 1	55420 1	55422 0	55424 0	55426 1	55430 0	45715 0	55411 0
01,2440	55413 1	55415 1	55417 0	55421 0	55423 1	55425 1	55427 0	55431 1
01,2450	47767 1	54157 0	54173 0	54207 0	54223 0	54237 0	54253 1	54267 0
01,2460	54067 1	32562 1	54430 1	62563 0	54504 1	62563 0	54560 0	62563 0
01,2470	54634 1	62563 0	54710 0	54570 1	54350 0	54144 1	47750 0	50144 0
01,2500	54313 1	10144 1	12475 1	54045 1	54345 1	54327 0	54304 1	54306 0
01,2510	54303 0	54311 0	54312 0	54330 0	54272 1	54273 0	54333 0	54334 1
01,2520	54335 0	54373 1	54336 0	54367 1	54370 1	54371 0	54372 0	54356 0
01,2530	54347 0	37764 0	54307 1	47763 0	54413 0	32573 1	54366 0	37756 1
01,2540	00006 1	02033 0	62575 1	54414 1	32560 0	55354 0	44565 1	54270 0
01,2550	32555 0	54411 1	00002 0	C; 02006 0	C; 03401 1	C; 02236 1	C; 01616 1	C; 00306 1
01,2560	C; 02115 0	C; 02013 1	C; 00430 0	C; 00054 0	C; 01400 1	C; 77755 0	C; 77757 1	C; 07400 1
01,2570	C; 37411 1	C; 00435 0	C; 37000 0	C; 16000 0	C; 00450 0	C; 00102 1	C; 00000 1	C; 00000 1
01,2600	C; 00005 1	C; 40512 0	C; 00000 1	C; 02037 1	C; 34066 0	C; 03606 1	C; 34066 0	00004 0
01,2610	02374 0	05270 1	C; 40114 1	05270 1	C; 40054 1	06067 0	C; 04000 0	06076 0
01,2620	C; 00020 0	00004 0	02151 0	32625 1	05161 1	C; 02140 0	02723 0	30107 1
01,2630	50120 1	54046 1	16125 0	02723 0	40107 0	02630 0	02711 1	50107 1
01,2640	30000 1	12630 1	02711 1	50107 1	40000 0	12630 1	02711 1	50120 1
01,2650	30046 0	50107 1	54000 0	16125 0	02711 1	50107 1	30000 1	50120 1
01,2660	56046 0	12651 0	02711 1	50107 1	30000 1	50120 1	26046 1	16125 0
01,2670	02723 0	30107 1	12665 1	02711 1	50107 1	40000 0	12665 1	02723 0
01,2700	50120 1	40050 0	50120 1	60046 0	00006 1	66125 1	50120 1	56046 0
01,2710	16724 1	40107 0	65353 1	10000 0	30110 1	12722 0	35352 0	56107 1
01,2720	54003 0	74564 0	26107 0	30110 1	54120 0	10020 1	24120 1	00002 0
01,2730	00002 0	10020 1	30107 1	15230 1	10144 1	16125 0	16724 1	16125 0
01,2740	16724 1	10111 1	12744 0	16125 0	54111 1	10020 1	12732 1	C; 00360 1
01,2750	16724 1	10020 1	07001 1	16125 0	16724 1	16125 0	10020 1	12765 0
01,2760	C; 12000 1	07001 1	16125 0	16125 0	16724 1	07001 1	16724 1	16724 1
01,2770	16125 0	10020 1	16716 0	04736 1	02711 1	50110 1	30052 0	12651 0

OCTAL LISTING OF PARAGRAPH # 026, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

01,3000	35343 0	70107 0	50000 1	37745 0	54121 1	37755 1	00006 1	70107 0
01,3010	54120 0	00004 0	50000 1	30074 1	54002 1	37751 0	00006 1	70107 0
01,3020	73060 0	50000 1	13023 1	30121 0	00006 1	04002 1	13035 0	30121 0
01,3030	00006 1	06002 0	13035 0	40121 1	70002 1	50120 1	54074 0	00003 1
01,3040	37747 1	00006 1	70107 0	73060 0	50000 1	13046 1	40002 1	70121 1
01,3050	10000 0	13061 1	16773 0	13061 1	04736 1	04736 1	30002 0	13047 0
01,3060	C; 00014 1	24154 1	16125 0	54061 1	10430 1	13100 1	10504 1	13100 1
01,3070	10560 0	13100 1	10634 1	13100 1	10710 0	13100 1	06000 1	C; 01201 0
01,3100	67762 0	22007 0	50000 1	21777 0	26063 0	37767 0	54064 1	33114 0
01,3110	54062 1	50064 0	10157 0	13154 0	C; 00006 1	13154 0	30063 1	50064 0
01,3120	54157 0	75341 0	50064 0	54156 1	10064 1	13141 1	54111 1	30156 0
01,3130	54110 0	10067 1	13141 1	04736 1	04736 1	54067 1	52066 0	52155 1
01,3140	15572 0	52066 0	50064 0	52155 1	50067 0	40157 0	60063 1	00006 1
01,3150	65572 1	30064 0	54067 1	15572 0	33265 0	26064 1	10062 1	13110 0
01,3160	06000 1	C; 01202 0	52155 1	50067 0	52155 1	52155 1	52145 0	50067 0
01,3170	52145 0	52145 0	52147 1	50067 0	52147 1	52147 1	52151 0	50067 0
01,3200	52151 0	52151 0	52153 1	50067 0	52153 1	52153 1	37767 0	56111 0
01,3210	00006 1	13214 1	40156 1	54156 1	52157 0	50067 0	52157 0	52157 0
01,3220	35341 1	70157 0	54110 0	10156 1	37767 0	13232 0	40156 1	54156 1
01,3230	37763 1	56111 0	54067 1	00003 1	52155 1	00006 1	63240 1	52006 0
01,3240	40000 0	67763 1	54154 0	16122 1	00004 0	40157 0	54157 0	35342 1
01,3250	70006 0	54155 1	47767 1	54121 1	13345 1	54061 1	37767 0	54064 1
01,3260	33114 0	54062 1	50064 0	10157 0	13267 0	C; 00014 1	13476 0	33265 0
01,3270	26064 1	10062 1	13261 0	47763 0	54064 1	15572 0	40065 0	50064 0
01,3300	60154 1	00006 1	13304 1	13267 0	50064 0	40157 0	54063 0	50064 0
01,3310	54157 0	46341 0	70065 0	67751 0	56065 1	76341 0	50064 0	60155 0
01,3320	54066 0	10064 1	13141 1	13131 0	54154 0	37767 0	54120 0	35341 1
01,3330	70157 0	60063 1	54157 0	40000 0	13253 1	00004 0	47767 1	54121 1
01,3340	56157 1	75341 0	10000 0	50000 1	54000 0	10173 0	03412 0	04736 1
01,3350	13351 1	10207 0	03412 0	04736 1	13355 0	10223 0	03412 0	C; 67620 1
01,3360	13361 1	10237 0	03412 0	04736 1	13365 0	10253 1	03412 0	04736 1
01,3370	13371 0	10267 0	03412 0	04736 1	13375 1	10121 1	04736 1	04736 1

OCTAL LISTING OF PARAGRAPH # 027, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

01,3400	13402 0	15576 1	10120 0	13405 1	13233 1	50000 1	27777 0	63357 0
01,3410	54067 1	13162 0	54122 1	60121 0	10000 0	40122 1	13422 1	13420 0
01,3420	50002 0	00002 0	54121 1	00006 1	22120 1	50120 1	00002 0	54062 1
01,3430	40026 1	67754 0	10000 0	66153 0	40000 0	63563 1	60002 0	10000 0
01,3440	61400 1	13503 0	13443 0	40002 1	67746 0	67746 0	56026 0	67745 0
01,3450	60002 0	00006 1	22007 0	57400 1	57401 0	57402 0	57403 1	57404 0
01,3460	57405 1	57406 1	57407 0	30063 1	50002 0	13466 1	53411 0	53413 1
01,3470	53415 1	53417 0	53421 0	53423 1	53425 1	53427 0	53431 1	65714 0
01,3500	00006 1	15674 0	13556 0	10000 0	61401 0	13511 0	67763 1	03564 0
01,3510	C; 00001 0	10000 0	61402 0	13517 0	67763 1	03564 0	C; 00002 0	10000 0
01,3520	61403 1	13525 1	67763 1	03564 0	C; 00003 1	10000 0	61404 0	13533 0
01,3530	67763 1	03564 0	C; 00004 0	10000 0	61405 1	13541 0	67763 1	03564 0
01,3540	C; 00005 1	10000 0	61406 1	13547 0	67763 1	03564 0	C; 00006 1	10000 0
01,3550	61407 0	13555 0	67763 1	03564 0	C; 00007 0	10000 0	06000 1	C; 01203 1
01,3560	67763 1	03564 0	C; 00010 0	C; 40201 0	54064 1	50002 0	30000 1	54002 1
01,3570	37763 1	60064 0	50002 0	27377 1	40064 1	50002 0	13453 1	54016 1
01,3600	00006 1	22012 1	37744 1	57407 0	57406 1	57405 1	57404 0	57403 1
01,3610	57402 0	57401 0	57400 1	67743 0	26026 1	55076 0	47767 1	55076 0
01,3620	00006 1	45715 0	53431 1	53427 0	53425 1	53423 1	53421 0	53417 0
01,3630	53415 1	53413 1	53411 0	52006 0	23435 1	37762 0	26002 1	55434 1
01,3640	00006 1	43652 1	21154 1	11154 1	13663 0	13646 1	13647 0	11153 0
01,3650	13663 0	C; 00000 1	C; 20000 0	37746 0	27154 1	05663 1	C; 03670 0	C; 02063 0
01,3660	33672 1	53435 0	52006 0	37746 0	05663 1	C; 03640 0	C; 02063 0	13660 0
01,3670	53152 1	52006 0	C; 05727 0	C; 03673 0	C; 03674 1	CKSM 10532 1	@	@
01,3700	@	@	@	@	@	@	@	@
01,3710	@	@	@	@	@	@	@	@
01,3720	@	@	@	@	@	@	@	@
01,3730	@	@	@	@	@	@	@	@
01,3740	@	@	@	@	@	@	@	@
01,3750	@	@	@	@	@	@	@	@
01,3760	@	@	@	@	@	@	@	@
01,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 040, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

04,2000	03472 0	03514 1	37763 1	56303 1	54105 1	56144 0	54107 0	50000 1
04,2010	02011 0	03313 0	02070 1	02070 1	02070 1	02070 1	02070 1	02070 1
04,2020	02070 1	02061 1	02061 1	03313 0	03313 0	03313 0	03313 0	03313 0
04,2030	03313 0	02066 0	02243 0	02355 0	02053 0	02056 0	03313 0	03313 0
04,2040	03313 0	03313 0	03336 1	02275 0	02262 0	02051 1	03313 0	02446 0
04,2050	02256 1	05225 1	C; 12003 1	04666 0	05225 1	C; 56350 1	04666 0	05225 1
04,2060	C; 56353 1	36311 1	70271 1	10000 0	02070 1	03313 0	37767 0	54107 0
04,2070	10270 0	02075 1	02075 1	02074 0	05567 0	02213 0	10306 0	37767 0
04,2100	54306 0	02102 0	50107 1	34300 0	74556 1	54114 1	30270 1	54133 1
04,2110	03217 0	36311 1	70271 1	10000 0	02125 0	50127 0	56272 0	54022 0
04,2120	40022 0	40022 0	56022 1	60107 1	02142 1	50127 0	56272 0	54144 1
04,2130	37767 0	54145 0	34570 1	07357 1	56145 1	60107 1	54145 0	02142 1
04,2140	26144 1	02160 1	50127 0	54272 1	40270 0	50127 0	62204 0	00006 1
04,2150	12152 1	02201 0	36311 1	70271 1	10000 0	02160 1	40270 0	02202 0
04,2160	07155 1	C; 02211 1	36311 1	70271 1	50000 1	02165 1	02172 1	00006 1
04,2170	40146 0	52146 0	56146 1	50127 0	54275 0	56145 1	50127 0	54272 1
04,2200	02156 1	10270 0	54270 0	05567 0	C; 00022 1	C; 00020 0	C; 00012 1	C; 00005 1
04,2210	C; 00000 1	C; 05174 0	C; 13261 0	50270 1	32217 1	54127 1	00002 0	C; 00004 0
04,2220	C; 00004 0	C; 00004 0	C; 00004 0	C; 00004 0	C; 00004 0	C; 00003 1	C; 00003 1	C; 00003 1
04,2230	C; 00003 1	C; 00002 0	C; 00002 0	C; 00002 0	C; 00002 0	C; 00002 0	04736 1	C; 00001 0
04,2240	C; 00001 0	C; 00000 1	C; 00000 1	37767 0	54272 1	34565 0	54270 0	02557 1
04,2250	37767 0	54271 1	54304 1	34505 0	54126 0	05567 0	37767 0	54273 0
04,2260	34566 0	02246 0	02334 1	02321 0	37762 0	50127 0	67755 1	26671 1
04,2270	10306 0	37767 0	54306 0	02274 1	05567 0	02334 1	02301 1	37763 1
04,2300	02265 1	22002 0	02213 0	50127 0	32327 0	54113 0	67763 1	54112 1
04,2310	37767 0	54114 1	56113 1	03301 0	37751 0	54114 1	56112 0	03301 0
04,2320	00001 0	22002 0	02213 0	50127 0	32327 0	54112 1	67763 1	54113 0
04,2330	02310 1	C; 00005 1	C; 00003 1	C; 00000 1	22002 0	36311 1	70271 1	10000 0
04,2340	05567 0	44527 1	02350 0	44530 1	02350 0	44531 0	02350 0	05567 0
04,2350	60270 1	00006 1	12354 0	00002 0	00001 0	56105 0	54303 0	00004 0
04,2360	37752 0	00006 1	05011 1	32444 1	70326 1	67745 0	54326 1	45642 0
04,2370	70366 0	65642 1	54366 0	47752 1	70365 0	67752 0	54365 0	42443 1

OCTAL LISTING OF PARAGRAPH # 041, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

04,2400	70412 1	67755 1	54412 1	47752 1	00006 1	03013 0	42442 0	00006 1
04,2410	03011 1	34570 1	54107 0	00004 0	50107 1	10313 1	67763 1	02424 1
04,2420	67763 1	40000 0	72445 1	02427 1	40000 0	72445 1	40000 0	50107 1
04,2430	54313 1	00003 1	10107 0	02412 1	37767 0	55360 1	55361 0	55362 0
04,2440	55357 0	05567 0	C; 00104 1	C; 00330 1	C; 00050 1	C; 73777 1	10270 0	67763 1
04,2450	02452 0	67763 1	50000 1	32217 1	54127 1	10306 0	02464 0	02461 0
04,2460	02461 0	30127 0	02506 0	02501 1	10127 1	54127 1	02506 0	32555 0
04,2470	26304 1	30127 0	54115 0	00006 1	26272 1	05206 0	C; 12315 0	30115 1
04,2500	54127 1	02504 1	24306 1	05567 0	22002 0	02516 1	65336 1	10000 0
04,2510	00002 0	04736 1	05567 0	00002 0	22002 0	02213 0	37767 0	50127 0
04,2520	54272 1	50127 0	54275 0	54114 1	50127 0	47755 0	70271 1	72556 1
04,2530	54271 1	50127 0	32546 1	54133 1	03217 0	50127 0	32551 1	54270 0
04,2540	02557 1	47762 1	26270 0	02557 1	50127 0	34525 1	54270 0	00001 0
04,2550	C; 00016 0	C; 00005 1	C; 00004 0	C; 00015 0	C; 00011 1	C; 00003 1	C; 77774 0	30270 1
04,2560	54021 0	42572 1	00004 0	50021 1	56313 0	00006 1	62570 1	24307 0
04,2570	00003 1	00002 0	C; 04000 0	37767 0	54146 0	02632 1	02600 0	02625 1
04,2600	02643 1	10144 1	56144 0	02606 0	02615 1	67771 1	62657 1	54144 1
04,2610	02613 1	37745 0	26144 1	37762 0	02574 0	56144 0	62657 1	10000 0
04,2620	02607 1	04736 1	67763 1	40000 0	02607 1	00006 1	50146 1	32654 1
04,2630	52114 1	00002 0	10144 1	00002 0	00002 0	12636 1	47745 1	70144 1
04,2640	54144 1	50002 0	00001 0	00006 1	50146 1	32654 1	52145 0	07357 1
04,2650	52114 1	20145 0	02663 0	C; 05605 1	C; 03656 1	C; 16314 0	C; 31463 1	C; 16040 1
04,2660	52114 1	52145 0	07357 1	05625 1	C; 12513 0	02677 0	56146 1	56145 1
04,2670	54144 1	02663 0	02677 0	02663 0	02677 0	03072 1	02663 0	56002 0
04,2700	54111 1	50130 0	02702 0	02720 0	50107 1	30140 1	74263 1	04523 1
04,2710	00006 1	50000 1	30001 0	52145 0	07327 0	07155 1	C; 00113 1	00111 0
04,2720	30135 0	02710 0	50130 0	02723 0	02726 0	03315 0	00006 1	50135 0
04,2730	30001 0	52145 0	34527 0	54270 0	37767 0	54146 0	07327 0	03173 1
04,2740	00126 1	07155 1	C; 03004 0	10145 0	37751 0	02747 1	47751 1	60145 1
04,2750	03104 1	04611 0	04611 0	03113 1	04611 0	10144 1	02762 0	02762 0
04,2760	40000 0	54144 1	10111 1	03000 1	02774 1	10144 1	04736 1	02776 0
04,2770	02771 1	56144 0	77743 1	54144 1	05225 1	C; 13040 1	47743 1	02773 0

OCTAL LISTING OF PARAGRAPH # 042, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

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04,3000      40144 1     77743 1     40000 0     02773 0  C: 26161 0  C: 30707 1  C: 21616 0  C: 07071 0
04,3010  C: 71527 1      07155 1  C: 00113 1     56146 1     56145 1     56144 0     00006 1     13021 0
04,3020      03315 0     03102 1     03113 1     02774 1     10144 1     03031 0     03031 0     03315 0
04,3030      03315 0     33010 0     26144 1     07155 1  C: 03006 1     37750 1     60145 1     03104 1

04,3040      02752 0     07155 1  C: 00113 1     56146 1     60000 1     54146 0     37767 0     60145 1
04,3050      03104 1     03113 1     50130 0     03053 1     03064 0     30107 1     60135 0     54002 1
04,3060      56145 1     50002 0     54001 1     02774 1     37767 0     03056 1     07155 1  C: 00113 1
04,3070      03072 1     03043 0     56002 0     54114 1     36306 1     54113 0     04611 0     10113 0

04,3100      03075 0     00114 0     56145 1     60000 1     54145 0     00002 0     60144 0     54144 1
04,3110      00002 0     54111 1     00002 0     10111 1     03315 0     00002 0     03315 0     56002 0
04,3120      54105 1     10144 1     03131 1     03131 1     67763 1     54144 1     02321 0     40145 0
04,3130      03133 0     02301 1     56145 1     63172 0     54145 0     37767 0     60144 0     54144 1

04,3140      03144 0     37743 0     54144 1     54145 0     37761 0     54127 1     34570 1     07357 1
04,3150      50144 0     34300 0     74556 1     54114 1     37767 0     56146 1     56145 1     54144 1
04,3160      56270 1     54133 1     10000 0     54270 0     03217 0     10127 1     03145 1     44565 1
04,3170      54270 0     00105 0  C: 02476 0     56002 0     54105 1     37767 0     54114 1     36311 1

04,3200      03301 0     37761 0     03301 0     10144 1     03214 0     03214 0     67763 1     54144 1
04,3210      02321 0     40145 0     54145 0     03215 1     02301 1     34530 0     03145 1     56002 0
04,3220      54104 0     34556 0     70133 1     54021 0     56021 1     54131 0     37763 1     70133 1
04,3230      10000 0     03233 0     03243 1     56114 0     04550 0     54114 1     37746 0     70133 1

04,3240      10000 0     37762 0     67763 1     54133 1     00004 0     50131 1     10313 1     03251 1
04,3250      04736 1     67763 1     54132 0     50133 0     73275 0     00006 1     60114 0     00006 1
04,3260      13213 0     50133 0     43275 0     70132 0     60114 0     40000 0     50131 1     56313 0
04,3270      00006 1     63273 1     24307 0     00003 1     00104 1  C: 00037 0  C: 01740 0  C: 02000 0

04,3300  C: 03740 1     54131 0     37762 0     54133 1     56002 0     54104 0     03244 0     03217 0
04,3310      33312 1     05230 0  C: 13250 1     34505 0     54126 0     04571 0     43325 1     60126 1
04,3320      00006 1     13323 1     00126 1     06000 1  C: 01501 1     04464 0     37763 1     54305 0
04,3330      04666 0     04626 1     03440 1     04466 1     47763 0     03327 1     47761 1     00006 1

04,3340      03011 1     04666 0     05567 0     37766 1     54270 0     54133 1     37763 1     70133 1
04,3350      56133 0     54021 0     56021 1     50000 1     10313 1     03357 0     04736 1     67763 1
04,3360      50133 0     73275 0     50133 0     03364 0     03366 1     04532 1     54114 1     47766 0
04,3370      60270 1     10000 0     67763 1     03375 0     04736 1     54133 1     03217 0     40270 0
```

OCTAL LISTING OF PARAGRAPH # 043, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

04,3400	64527 0	10000 0	56270 1	67763 1	03344 1	37767 0	54270 0	63436 0
04,3410	50000 1	10313 1	03414 0	04736 1	67763 1	77751 1	54114 1	50270 1
04,3420	33434 1	03301 0	40270 0	63436 0	10000 0	56270 1	67763 1	03406 0
04,3430	34527 0	54270 0	02514 0	00126 1	C; 00000 1	C; 00001 0	C; 00003 1	C; 00004 0
04,3440	10327 0	03446 1	05567 0	03446 1	54327 0	03464 1	37767 0	56327 1
04,3450	00004 0	05551 0	10305 0	03470 1	05567 0	03466 0	37762 0	50064 0
04,3460	60154 1	50064 0	54154 0	00003 1	04711 1	05567 0	37767 0	03457 1
04,3470	37763 1	03457 1	54001 1	10330 0	03477 0	30001 0	05230 0	37762 0
04,3500	54134 0	50134 1	10333 0	03505 1	03510 0	10134 0	03500 1	03554 0
04,3510	30001 0	50134 1	54333 0	05545 0	54001 1	10303 0	03521 1	30001 0
04,3520	05230 0	37762 0	54330 0	30001 0	56335 1	56334 0	56333 1	10000 0
04,3530	03554 0	03533 1	03554 0	04601 1	30001 0	05545 0	35210 1	05505 1
04,3540	C; 03543 0	C; 10060 0	05727 0	04714 1	03552 0	05551 0	00003 1	37763 1
04,3550	54330 0	05567 0	37767 0	03550 1	06000 1	C; 01206 1	C; 03556 1	C; 03557 0
04,3560	CKSM 66667 0	@	@	@	@	@	@	@
04,3570	@	@	@	@	@	@	@	@
04,3600	@	@	@	@	@	@	@	@
04,3610	@	@	@	@	@	@	@	@
04,3620	@	@	@	@	@	@	@	@
04,3630	@	@	@	@	@	@	@	@
04,3640	@	@	@	@	@	@	@	@
04,3650	@	@	@	@	@	@	@	@
04,3660	@	@	@	@	@	@	@	@
04,3670	@	@	@	@	@	@	@	@
04,3700	@	@	@	@	@	@	@	@
04,3710	@	@	@	@	@	@	@	@
04,3720	@	@	@	@	@	@	@	@
04,3730	@	@	@	@	@	@	@	@
04,3740	@	@	@	@	@	@	@	@
04,3750	@	@	@	@	@	@	@	@
04,3760	@	@	@	@	@	@	@	@
04,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 044, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

05,2000	03344 1	13403 1	02663 0	37767 0	54306 0	34505 0	54126 0	10304 1
05,2010	02031 1	02031 1	02013 1	36311 1	70271 1	10000 0	02020 1	02024 0
05,2020	10270 0	02324 0	02324 0	02024 0	40304 1	54304 1	04626 1	00304 0
05,2030	C; 00030 1	37767 0	54271 1	40272 1	62030 0	00006 1	62116 0	00006 1
05,2040	32076 1	52006 0	50130 0	02043 1	02046 1	02176 0	10136 1	02114 1
05,2050	02324 0	02055 0	24310 0	04521 0	02102 0	37745 0	54306 0	44505 1
05,2060	60126 1	00006 1	12064 0	02100 1	02256 1	10271 1	02324 0	56476 1
05,2070	04513 1	00006 1	32076 1	52006 0	02116 0	C; 02000 0	C; 46060 0	C; 77772 0
05,2100	30146 1	04513 1	47760 0	70272 1	62077 0	00006 1	12116 1	34531 1
05,2110	54270 0	30310 0	03222 0	02116 0	67763 1	04513 1	42131 1	60272 0
05,2120	10000 0	67763 1	02124 1	02133 1	54144 1	04666 0	56144 0	62132 0
05,2130	05230 0	C; 00040 0	C; 22000 1	50272 0	32136 1	05230 0	C; 12324 1	C; 12340 0
05,2140	C; 12345 0	C; 12352 0	C; 12333 1	C; 12326 0	C; 12445 1	C; 10722 1	C; 11315 0	C; 13077 0
05,2150	C; 13077 0	C; 13077 0	C; 13077 0	C; 13077 0	C; 13077 0	C; 13077 0	C; 12324 1	C; 12620 0
05,2160	C; 12631 0	C; 12646 0	C; 12572 1	C; 12535 1	C; 12324 1	C; 13214 1	C; 13314 0	C; 13340 1
05,2170	C; 11343 0	C; 11326 0	C; 11333 1	C; 13414 1	C; 02000 0	C; 13267 0	10136 1	02203 1
05,2200	02324 0	02203 1	02203 1	46306 0	60272 0	00006 1	62210 0	02116 0
05,2210	37762 0	54107 0	62235 1	54135 1	50107 1	30140 1	54112 1	02721 1
05,2220	02236 1	02223 0	24112 0	30112 0	74563 1	04523 1	50000 1	30000 1
05,2230	50135 0	56000 1	10107 0	02211 1	02116 0	00115 1	50000 1	12240 1
05,2240	00002 0	00002 0	00002 0	00002 0	12250 0	12250 0	00002 0	12250 0
05,2250	50002 0	00001 0	34527 0	12257 1	34530 0	12257 1	34531 1	54470 0
05,2260	40002 1	54304 1	05206 0	C; 10514 0	04622 0	44505 1	60126 1	00006 1
05,2270	12273 1	47767 1	54327 0	00126 1	54273 0	56002 0	54107 0	00006 1
05,2300	32076 1	52006 0	10136 1	67763 1	12307 0	12310 0	12310 0	04513 1
05,2310	34566 0	54270 0	30273 1	12322 1	54272 1	56002 0	54107 0	34565 0
05,2320	54270 0	30272 0	03255 0	00107 1	05225 1	C; 11315 0	47762 1	02376 1
05,2330	50135 0	40002 1	56122 0	47763 0	02376 1	50135 0	40001 1	56121 0
05,2340	02420 0	50135 0	40000 0	56120 1	02357 1	47763 0	02376 1	50135 0
05,2350	40001 1	02343 1	47762 1	02376 1	50135 0	40002 1	02343 1	47762 1
05,2360	60272 0	10000 0	02365 0	00126 1	02365 0	54112 1	50000 1	34527 0
05,2370	54270 0	50112 0	40120 0	03222 0	56112 0	02361 1	54113 0	22002 0

OCTAL LISTING OF PARAGRAPH # 045. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD. "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

05,2400	47763 0	60273 1	00006 1	12417 0	50130 0	32442 1	50000 1	30000 1
05,2410	74560 1	04541 0	60113 1	10000 0	00001 0	04736 1	02324 0	00001 0
05,2420	22002 0	30136 0	67763 1	00006 1	12436 0	50130 0	02426 0	02431 0
05,2430	00001 0	02713 0	02236 1	00001 0	24135 0	00001 0	00006 1	50310 0
05,2440	00000 1	40000 0	12343 0	C; 00137 1	C; 00136 0	50130 0	32442 1	50000 1
05,2450	30000 1	74560 1	04541 0	54107 0	54112 1	60135 0	50000 1	40000 0
05,2460	50112 0	56274 0	10112 1	02454 0	37767 0	54145 0	54146 0	50107 1
05,2470	34527 0	54270 0	50107 1	40674 1	54144 1	02734 0	54113 0	00006 1
05,2500	32512 0	52006 0	50130 0	02503 0	02507 1	02721 1	02522 0	02713 0
05,2510	02522 0	C; 02037 1	C; 46060 0	05206 0	C; 11117 0	10107 0	02520 1	00126 1
05,2520	54107 0	02464 0	50000 1	32525 1	05230 0	C; 11315 0	C; 12513 0	C; 10573 1
05,2530	C; 10660 0	C; 10665 0	C; 10672 0	C; 10601 1	C; 10674 0	47762 1	02376 1	32673 1
05,2540	02314 0	02252 0	32674 0	02314 0	02254 0	32675 1	02314 0	02456 1
05,2550	46306 0	02676 1	00006 1	32076 1	52006 0	37767 0	02762 0	50135 0
05,2560	54000 0	37763 1	02762 0	50135 0	54001 1	37762 0	02762 0	50135 0
05,2570	54002 1	02663 0	47763 0	02376 1	32673 1	02314 0	02452 0	32674 0
05,2600	02314 0	02254 0	47766 0	02676 1	00006 1	32076 1	52006 0	37767 0
05,2610	02762 0	50135 0	54000 0	37763 1	02762 0	50135 0	54001 1	02663 0
05,2620	02252 0	00006 1	32076 1	52006 0	37767 0	02762 0	50135 0	54000 0
05,2630	02663 0	47763 0	02376 1	37745 0	54306 0	02254 0	00006 1	32076 1
05,2640	52006 0	37763 1	02762 0	50135 0	54001 1	02663 0	47762 1	02376 1
05,2650	37745 0	54306 0	02256 1	00006 1	32076 1	52006 0	37762 0	02762 0
05,2660	50135 0	54002 1	02663 0	37767 0	54271 1	47767 1	54305 0	44565 1
05,2670	54270 0	05225 1	C; 11440 1	C; 00021 1	C; 00022 1	C; 00023 0	54107 0	40271 1
05,2700	54021 0	40021 0	40021 0	10000 0	12706 0	00002 0	60107 1	00006 1
05,2710	12712 0	02324 0	00002 0	56002 0	54104 0	34557 1	70137 0	04532 1
05,2720	00104 1	56002 0	54104 0	50107 1	32753 1	54001 1	50107 1	34556 0
05,2730	70143 0	50001 0	00000 1	00104 1	56002 0	54104 0	50130 0	02737 0
05,2740	02756 1	50107 1	32753 1	54001 1	50107 1	34556 0	70137 0	50001 0
05,2750	00000 1	60000 1	00104 1	02712 1	04532 1	04541 0	34556 0	70137 0
05,2760	60000 1	00104 1	54107 0	56002 0	54105 1	37767 0	54111 1	50107 1
05,2770	56277 0	54145 0	50107 1	56274 0	54144 1	50130 0	02776 0	03023 0

OCTAL LISTING OF PARAGRAPH # 046; WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

05,3000	50107 1	30140 1	74563 1	04513 1	00006 1	60107 1	54135 1	10271 1
05,3010	03051 0	02721 1	02236 1	03040 0	24135 0	30135 0	26107 0	37767 0
05,3020	50107 1	53777 0	03040 0	04521 0	10271 1	03051 0	02713 0	02236 1
05,3030	03034 0	37767 0	54107 0	03014 1	30136 0	67763 1	00006 1	13044 0
05,3040	56144 0	00105 0	C; 02045 1	C; 46060 0	56144 0	00006 1	50310 0	01000 0
05,3050	02663 0	02734 0	54113 0	00006 1	33043 0	52006 0	50130 0	03057 0
05,3060	03063 1	02721 1	03064 0	02713 0	50000 1	33067 0	05430 0	C; 11315 0
05,3070	C; 11021 1	C; 10741 1	C; 11011 1	C; 11041 1	C; 11066 1	C; 11024 1	C; 11041 1	47745 1
05,3100	70310 1	54145 0	33401 1	70272 1	04541 0	54022 0	56022 1	60273 1
05,3110	54144 1	40330 0	67762 0	10000 0	04711 1	03121 0	04736 1	37767 0
05,3120	54303 0	00004 0	10311 0	03130 0	37763 1	05663 1	C; 03134 1	C; 12060 1
05,3130	52145 0	52312 0	00003 1	00126 1	04605 0	10312 0	03142 0	03142 0
05,3140	03153 0	03153 0	33157 1	05663 1	C; 03134 1	C; 12060 1	35210 1	05505 1
05,3150	C; 03160 0	C; 12060 1	05727 0	37767 0	54311 0	54312 0	05727 0	C; 00144 0
05,3160	10312 0	03165 0	03165 0	05567 0	05567 0	10303 0	03212 0	33401 1
05,3170	70311 0	54113 0	04460 1	05567 0	33210 1	70311 0	04532 1	54020 1
05,3200	56020 0	54272 1	33211 0	54126 0	47745 1	70312 0	54146 0	02037 1
05,3210	C; 00700 0	C; 04435 1	04601 1	05567 0	34527 0	54270 0	30310 0	05241 0
05,3220	03222 0	05567 0	54022 0	56002 0	54105 1	37746 0	26470 0	37761 0
05,3230	54127 1	40022 0	40022 0	40022 0	40000 0	77765 0	50000 1	34300 0
05,3240	74556 1	54114 1	56270 1	54133 1	10000 0	54270 0	05425 1	C; 11307 0
05,3250	10127 1	03230 0	44565 1	54270 0	00105 0	54020 1	56002 0	54105 1
05,3260	37763 1	54127 1	40020 1	40020 1	56020 0	54022 0	03435 0	03302 0
05,3270	37767 0	56273 1	54144 1	34566 0	54270 0	05206 0	C; 10557 1	30144 0
05,3300	05225 1	C; 11315 0	40002 1	54304 1	34566 0	54270 0	37767 0	54273 0
05,3310	05206 0	C; 10557 1	04622 0	00126 1	37763 1	70337 1	10000 0	03336 1
05,3320	35723 1	54144 1	47763 0	70337 1	54150 1	04666 0	34505 0	54147 1
05,3330	00006 1	30341 1	52146 0	30150 0	00004 0	00144 0	34562 1	03321 1
05,3340	34561 1	54144 1	30337 0	03324 1	33363 1	54126 0	33401 1	70113 0
05,3350	54144 1	33402 1	70113 0	04532 1	54020 1	56020 0	54145 0	10144 1
05,3360	03364 0	56145 1	02314 0	04464 0	10145 0	03371 1	56144 0	02274 1
05,3370	04464 0	56145 1	02314 0	56144 0	02274 1	37767 0	54305 0	54306 0

OCTAL LISTING OF PARAGRAPH # 047, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

05,3400	02031 1	C: 00077 1	C: 07700 1	34567 1	56270 1	54130 1	30302 0	22002 0
05,3410	03255 0	56130 0	54270 0	00001 0	00004 0	47763 0	70366 0	67763 1
05,3420	54366 0	33457 1	00006 1	05011 1	33460 0	54326 1	37752 0	00006 1
05,3430	05013 0	34570 1	54107 0	43455 1	50107 1	54313 1	10107 0	03432 1
05,3440	43456 1	54314 0	54317 0	54321 0	37764 0	54307 1	00003 1	33462 1
05,3450	00004 0	05663 1	C: 03463 0	C: 12060 1	05567 0	C: 05675 0	C: 07675 1	C: 00175 1
05,3460	C: 40650 0	C: 00115 1	C: 00764 1	35210 1	05505 1	C: 03470 1	C: 12060 1	05727 0
05,3470	43461 0	00004 0	00006 1	03011 1	47752 1	00006 1	03013 0	37745 0
05,3500	54326 1	43521 0	70366 0	65642 1	54366 0	43523 1	70365 0	65641 1
05,3510	54365 0	43522 0	70412 1	67755 1	54414 1	00003 1	02001 1	05225 1
05,3520	C: 11333 1	C: 16001 1	C: 00330 1	C: 55000 1	C: 03524 1	C: 03525 0	CKSM 05305 1	@
05,3530	@	@	@	@	@	@	@	@
05,3540	@	@	@	@	@	@	@	@
05,3550	@	@	@	@	@	@	@	@
05,3560	@	@	@	@	@	@	@	@
05,3570	@	@	@	@	@	@	@	@
05,3600	@	@	@	@	@	@	@	@
05,3610	@	@	@	@	@	@	@	@
05,3620	@	@	@	@	@	@	@	@
05,3630	@	@	@	@	@	@	@	@
05,3640	@	@	@	@	@	@	@	@
05,3650	@	@	@	@	@	@	@	@
05,3660	@	@	@	@	@	@	@	@
05,3670	@	@	@	@	@	@	@	@
05,3700	@	@	@	@	@	@	@	@
05,3710	@	@	@	@	@	@	@	@
05,3720	@	@	@	@	@	@	@	@
05,3730	@	@	@	@	@	@	@	@
05,3740	@	@	@	@	@	@	@	@
05,3750	@	@	@	@	@	@	@	@
05,3760	@	@	@	@	@	@	@	@
05,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 050, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
06,2000  C; 02627 0  C; 02414 1  C; 05741 0  C; 05516 0  C; 05663 1     05221 0  C; 10000 0  C; 05576 0
06,2010  C; 04003 0  C; 10000 0  C; 05576 0  C; 04003 0  C; 00303 1  C; 74321 1  C; 17712 0  C; 20000 0
06,2020  C; 02063 0  C; 74064 0  C; 01304 1  C; 75657 1  C; 74064 0  C; 15530 0  C; 74741 0  C; 11713 1
06,2030  C; 20000 0  C; 03023 0  C; 66064 0  C; 77777 0  C; 75646 1  C; 15714 1  C; 12574 1  C; 75123 0

06,2040  C; 25773 0  C; 77777 0  C; 75614 0  C; 25773 0  C; 00620 0  C; 75470 0  C; 25773 0  C; 76035 0
06,2050  C; 75554 1  C; 21774 0  C; 01274 1  C; 75426 0  C; 11713 1  C; 00310 0  C; 75561 1  C; 11713 1
06,2060  C; 77777 0  C; 75621 0  C; 03713 1  C; 01356 0  C; 75566 0  C; 03713 1  C; 77777 0  C; 75561 1
06,2070  C; 03713 1  C; 00144 0  C; 75314 0  C; 03713 1  C; 20000 0  C; 02017 0  C; 74064 0  C; 20000 0

06,2100  C; 02032 1  C; 74064 0  C; 01304 1  C; 75657 1  C; 74064 0  C; 77777 0  C; 75453 1  C; 03713 1
06,2110  C; 01750 1  C; 75445 0  C; 03713 1  C; 15530 0  C; 74741 0  C; 11713 1  C; 02114 1  C; 74665 1
06,2120  C; 11713 1  C; 11610 0  C; 74327 1  C; 11713 1  C; 00062 0  C; 74535 1  C; 11715 1  C; 00372 1
06,2130  C; 74527 1  C; 11715 1  C; 76473 0  C; 74437 1  C; 11713 1  C; 00764 1  C; 74415 1  C; 11713 1

06,2140  C; 77777 0  C; 75547 0  C; 21774 0  C; 77777 0  C; 75534 1  C; 21774 0  C; 00062 0  C; 75415 0
06,2150  C; 03713 1  C; 77777 0  C; 75307 1  C; 17713 1  C; 01743 0  C; 75507 1  C; 56003 1  C; 77777 0
06,2160  C; 75740 0  C; 15715 0  C; 00144 0  C; 77777 1  C; 15715 0  C; 02260 1  C; 75624 1  C; 03713 1
06,2170  C; 00310 0  C; 75215 0  C; 03713 1  C; 00144 0  C; 75207 0  C; 03713 1  C; 13560 0  C; 75200 1

06,2200  C; 03713 1  C; 00144 0  C; 75232 0  C; 03713 1  C; 20000 0  C; 02651 1  C; 72065 1  C; 77777 0
06,2210  C; 74326 0  C; 21773 1  C; 04704 0  C; 74272 0  C; 21773 1  C; 30000 1  C; 03540 0  C; 60065 1
06,2220  C; 10000 0  C; 02670 1  C; 56003 1  C; 15000 0  C; 02056 0  C; 56003 1  C; 25000 0  C; 03507 0
06,2230  C; 60065 1  C; 01304 1  C; 74643 0  C; 66064 0  C; 27000 1  C; 03157 1  C; 66064 0  C; 76472 1

06,2240  C; 74547 1  C; 11715 1  C; 21000 1  C; 02412 1  C; 60064 0  C; 00310 0  C; 75144 1  C; 17712 0
06,2250  C; 00310 0  C; 75777 1  C; 17712 0  C; 32000 0  C; 03575 0  C; 24003 1  C; 00310 0  C; 75144 1
06,2260  C; 17712 0  C; 20000 0  C; 02133 1  C; 60065 1  C; 00310 0  C; 75144 1  C; 17712 0  C; 00000 1
06,2270  C; 00000 1  C; 00000 1  C; 20000 0  C; 02020 1  C; 72065 1  C; 77777 0  C; 75706 1  C; 05712 0

06,2300  C; 20000 0  C; 02727 1  C; 72065 1  C; 20000 0  C; 02757 0  C; 72065 1  C; 20000 0  C; 02710 0
06,2310  C; 72065 1  C; 20000 0  C; 02126 0  C; 72065 1  C; 77777 0  C; 75666 0  C; 05712 0  C; 20000 0
06,2320  C; 02630 0  C; 72065 1  C; 00620 0  C; 75777 1  C; 17712 0  C; 77777 0  C; 75707 0  C; 17712 0
06,2330  C; 77777 0  C; 75777 1  C; 17712 0  C; 76435 1  C; 75777 1  C; 17712 0  C; 77777 0  C; 75754 0

06,2340  C; 21774 0  C; 00764 1  C; 75225 0  C; 55770 1  C; 30000 1  C; 02541 0  C; 22007 0  C; 00764 1
06,2350  C; 75225 0  C; 55770 1  C; 33000 1  C; 02440 0  C; 54004 1  C; 30000 1  C; 02464 0  C; 54004 1
06,2360  C; 76432 0  C; 75504 1  C; 03710 1  C; 00000 1  C; 00010 0  C; 00011 1  C; 00027 1  C; 00000 1
06,2370  C; 00142 0  C; 00000 1  C; 00211 0  C; 00234 1  C; 00260 0  C; 00333 1  C; 00343 0     30151 1
```

OCTAL LISTING OF PARAGRAPH # 051, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

06,2400	60000 1	54145 0	32003 0	54734 0	32000 0	54147 1	32005 0	54737 0
06,2410	30144 0	75352 1	10000 0	12424 0	10144 1	10000 0	12513 0	35640 0
06,2420	05516 0	C; 05567 0	C; 04003 0	02005 0	75352 1	10000 0	12475 1	00006 1
06,2430	50145 1	31517 0	52736 1	30144 0	77765 0	65336 1	10000 0	12576 0
06,2440	C; 37776 0	12443 1	12510 0	32004 1	54734 0	50145 1	31114 1	10000 0
06,2450	24000 1	12454 1	14064 0	12473 1	40000 0	54001 1	50145 1	41113 1
06,2460	00006 1	60025 0	10000 0	40000 0	62440 0	67763 1	60001 0	10000 0
06,2470	37767 0	12473 1	12473 1	67763 1	00734 1	32005 0	54147 1	32001 1
06,2500	54737 0	30144 0	75342 0	54144 1	00006 1	50145 1	31517 0	52736 1
06,2510	50145 1	31114 1	00734 1	54020 1	10020 1	12516 0	12616 0	32005 0
06,2520	54737 0	30144 0	54021 0	60021 1	50145 1	62364 1	54146 0	00006 1
06,2530	50146 1	32002 1	22736 0	10000 0	24000 1	12610 0	24000 1	54735 1
06,2540	32004 1	54734 0	30736 0	77752 1	10000 0	12603 1	50146 1	32000 0
06,2550	14073 0	53154 1	00006 1	40025 1	21154 1	00006 1	31433 1	21154 1
06,2560	11153 0	12571 1	12564 0	12470 1	11154 1	12571 1	12567 0	12470 1
06,2570	12473 1	32002 1	54734 0	00006 1	31154 0	00734 1	32004 1	54734 0
06,2600	50145 1	41114 0	14073 0	40736 1	54736 1	50146 1	32000 0	12447 0
06,2610	56735 0	32003 0	54734 0	50146 1	32000 0	00734 1	30147 0	54737 0
06,2620	50145 1	32363 0	60144 0	60144 0	60144 0	54146 0	12527 1	36311 1
06,2630	26146 0	32005 0	54737 0	12527 1	22073 0	30065 1	77765 0	60000 1
06,2640	54061 1	30065 1	74241 0	00006 1	77750 0	54062 1	30065 1	72705 0
06,2650	56065 1	75640 1	10000 0	14175 1	30062 0	50061 0	55076 0	10066 0
06,2660	12674 1	12662 0	40072 0	22072 1	50071 1	53076 0	10066 0	12670 0
06,2670	12674 1	40025 1	50071 1	55111 0	10065 0	12710 1	12713 1	40025 1
06,2700	50061 0	55111 0	30065 1	62706 1	10000 0	C; 60000 1	C; 17777 0	12713 1
06,2710	00006 1	30025 0	53433 0	40062 1	50061 0	55075 0	30002 0	22073 0
06,2720	00003 1	52006 0	22073 0	30062 0	50061 0	55076 0	30070 0	50061 0
06,2730	55112 0	00006 1	30064 0	50061 0	53515 0	12657 0	04644 0	33012 1
06,2740	10000 0	54146 0	33015 0	04657 1	24146 1	33013 0	04657 1	04475 0
06,2750	02753 1	02752 0	02742 1	33014 1	04657 1	04475 0	05566 1	02762 0
06,2760	30337 0	02740 0	33016 0	04657 1	00004 0	37762 0	05663 1	C; 03023 0
06,2770	C; 14064 0	37763 1	05663 1	C; 03156 0	C; 14064 0	36311 1	05663 1	C; 03253 0

OCTAL LISTING OF PARAGRAPH # 052, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "E" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

06,3000	C; 14064 0	37761 0	05663 1	C; 03373 0	C; 14064 0	37766 1	05663 1	C; 03461 1	
06,3010	C; 14064 0	05566 1	C; 02007 1	C; 02102 0	C; 02130 1	C; 00401 1	C; 04700 1	11407 1	
06,3020	03022 1	05727 0	55407 1	51407 0	11410 1	03027 1	03017 1	51407 0	
06,3030	31420 0	05663 1	C; 03046 0	C; 14064 0	05727 0	37767 0	00006 1	01005 0	
06,3040	00006 1	01006 0	51407 0	11410 1	51407 0	55410 1	51407 0	11410 1	
06,3050	03052 0	03017 1	51407 0	31430 1	05663 1	C; 03060 1	C; 14064 0	05727 0	
06,3060	51407 0	31440 0	55401 1	51407 0	31450 1	55402 1	00006 1	00032 0	
06,3070	40000 0	55403 0	37765 1	55404 1	31403 1	51404 0	77754 1	10000 0	
06,3100	03117 0	11404 1	03073 0	31401 0	00006 1	01005 0	31402 0	00006 1	
06,3110	01006 0	51407 0	31460 1	05663 1	C; 03035 1	C; 14064 0	05727 0	51404 0	
06,3120	43142 1	71401 1	55401 1	51404 0	43132 0	71402 1	55402 1	04755 1	
06,3130	C; 01410 0	03101 1	C; 00010 0	C; 00020 0	C; 00004 0	C; 00200 0	C; 00001 0	C; 00002 0	
06,3140	C; 00040 0	C; 00100 0	C; 00040 0	C; 00020 0	C; 00100 0	C; 00200 0	C; 00010 0	C; 00001 0	
06,3150	C; 00004 0	C; 00002 0	11470 1	03155 0	05727 0	55470 1	51470 0	11471 0	
06,3160	03162 1	03152 1	51470 0	31474 1	05663 1	C; 03206 0	C; 14064 0	05727 0	
06,3170	45210 0	00006 1	02011 0	67746 0	00006 1	01011 0	51470 0	11471 0	
06,3200	10000 0	03203 0	03152 1	67763 1	51470 0	55471 0	51470 0	31502 1	
06,3210	55406 0	51470 0	31477 1	05663 1	C; 03217 0	C; 14064 0	05727 0	45210 0	
06,3220	00006 1	02011 0	67747 1	00006 1	01011 0	11406 0	03235 0	51470 0	
06,3230	31505 0	05663 1	C; 03170 1	C; 14064 0	05727 0	11406 0	03240 1	03225 1	
06,3240	55406 0	33246 1	05663 1	C; 03235 0	C; 14064 0	05727 0	C; 27340 0	11510 0	
06,3250	03252 1	05727 0	55510 0	51510 1	11511 1	03257 1	03247 0	51510 1	
06,3260	31525 1	05663 1	C; 03300 1	C; 14064 0	05727 0	43364 1	00006 1	03012 1	
06,3270	51510 1	11511 1	10000 0	03275 1	03247 0	67763 1	51510 1	55511 1	
06,3300	51510 1	31541 0	05663 1	C; 03306 1	C; 14064 0	05727 0	33363 1	00006 1	
06,3310	06032 0	73363 0	00006 1	13321 0	35656 1	05505 1	C; 03334 0	C; 14064 0	
06,3320	05727 0	51510 1	31571 0	73364 1	00006 1	05012 1	51510 1	31555 0	
06,3330	05663 1	C; 03265 0	C; 14064 0	05727 0	04644 0	33363 1	54337 1	33365 1	
06,3340	04657 1	33366 1	04657 1	04622 0	04475 0	05566 1	03355 1	00004 0	
06,3350	37762 0	05663 1	C; 03306 1	C; 14064 0	05566 1	00004 0	37762 0	05663 1	
06,3360	C; 03321 1	C; 14064 0	05566 1	C; 01400 1	C; 07400 1	C; 00125 1	C; 05000 1	11605 1	
06,3370	03372 1	05727 0	55605 1	51605 0	11606 1	03377 1	03367 0	51605 0	

OCTAL LISTING OF PARAGRAPH # 053, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

06,3400	31614 0	05663 1	C: 03425 1	C: 14064 0	05727 0	51605 0	31636 0	03443 1
06,3410	67763 1	05663 1	C: 03415 1	C: 14064 0	05727 0	51605 0	11606 1	10000 0
06,3420	03422 0	03367 0	67763 1	51605 0	55606 1	51605 0	31622 0	05663 1
06,3430	C: 03433 0	C: 14064 0	05727 0	51605 0	31630 0	03443 1	63460 0	05663 1
06,3440	C: 03405 0	C: 14064 0	05727 0	54055 0	55405 0	37760 1	00006 1	05014 1
06,3450	31405 1	00006 1	63454 1	40000 0	40000 0	00006 1	77752 1	00002 0
06,3460	C: 00031 0	11654 0	03464 1	05727 0	36311 1	55655 1	51655 0	31644 0
06,3470	00006 1	51655 0	02030 0	51655 0	57644 0	51655 0	31650 0	00006 1
06,3500	51655 0	04030 0	51655 0	57650 0	11655 1	03465 0	34570 1	05663 1
06,3510	C: 03461 1	C: 14064 0	05727 0	C: 03513 0	C: 03514 1	CKSM 43435 1	@	@
06,3520	@	@	@	@	@	@	@	@
06,3530	@	@	@	@	@	@	@	@
06,3540	@	@	@	@	@	@	@	@
06,3550	@	@	@	@	@	@	@	@
06,3560	@	@	@	@	@	@	@	@
06,3570	@	@	@	@	@	@	@	@
06,3600	@	@	@	@	@	@	@	@
06,3610	@	@	@	@	@	@	@	@
06,3620	@	@	@	@	@	@	@	@
06,3630	@	@	@	@	@	@	@	@
06,3640	@	@	@	@	@	@	@	@
06,3650	@	@	@	@	@	@	@	@
06,3660	@	@	@	@	@	@	@	@
06,3670	@	@	@	@	@	@	@	@
06,3700	@	@	@	@	@	@	@	@
06,3710	@	@	@	@	@	@	@	@
06,3720	@	@	@	@	@	@	@	@
06,3730	@	@	@	@	@	@	@	@
06,3740	@	@	@	@	@	@	@	@
06,3750	@	@	@	@	@	@	@	@
06,3760	@	@	@	@	@	@	@	@
06,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 054, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
07,2000    04755 1  C; 00316 0    12014 1    00004 0    05270 1  C; 02374 0    12014 1    00004 0
07,2010    05270 1  C; 02374 0    04755 1  C; 00315 0    06067 0  C; 04000 0    00004 0    00006 1
07,2020    32102 0    53075 0    00006 1    32100 1    53073 0    32076 1    55346 0    55310 0
07,2030    05270 1  C; 40263 1    05270 1  C; 40114 1    05270 1  C; 40066 0    05270 1  C; 40054 1

07,2040    42075 0    00006 1    03012 1    47767 1    22007 0    53102 1    47767 1    22007 0
07,2050    53104 1    47767 1    22007 0    53106 0    47767 1    22007 0    53112 0    47767 1
07,2060    55173 1    55172 0    55171 0    55170 1    55164 1    55165 0    55166 0    55167 1
07,2070    05225 1  C; 02275 0    06067 0  C; 00041 1    15567 1  C; 07400 1  C; 02237 0  C; 02324 0

07,2100  C; 60063 1  C; 02072 0  C; 16063 0    04632 1    15567 1    12107 1    04644 0    32112 1
07,2110    04657 1    05566 1  C; 01550 0    04755 1  C; 00312 1    14750 0    53631 0    06112 0
07,2120  I; 77624 1  C; 16324 0  I; 77775 1  C; 16226 0  C; 02015 1  C; 02023 1  C; 02045 1  I; 66370 0
07,2130  C; 00014 1  C; 00051 0  C; 00006 1  I; 73773 0  C; 01025 1  C; 16250 1  I; 72505 1  C; 01463 1

07,2140  C; 06015 0  C; 06045 0  I; 77500 1  C; 16133 1    00006 1    31307 1    53447 0    02276 0
07,2150    53631 0    52006 0  C; 02400 1  I; 77776 1    06112 0  I; 40145 0  C; 02167 0  C; 16160 1
07,2160  I; 47025 0  C; 02047 0  C; 33520 0  I; 56261 1  C; 20214 1  C; 17755 0  C; 02163 1  I; 51400 1
07,2170  C; 16206 1  I; 50025 0  C; 16236 1  C; 16354 1  I; 45215 0  C; 16236 1  C; 16244 1  I; 77640 0

07,2200  C; 17450 0  I; 75345 1  C; 16244 1  C; 02163 1  C; 36163 0  C; 17450 0  I; 77634 0  C; 73501 1
07,2210  C; 36163 0  C; 16201 0  C; 00016 0  C; 00004 0  C; 00022 1  C; 00000 1  C; 05360 1  C; 00001 0
07,2220  C; 24570 0  C; 00000 1  C; 00310 0  C; 00000 1  C; 05670 0  C; 00000 1  C; 00000 1  C; 00000 1
07,2230  C; 00000 1  C; 00000 1  C; 00000 1  C; 20304 1  C; 23351 1  C; 00000 1  C; 17565 1  C; 37200 1

07,2240  C; 00000 1  C; 24605 1  C; 15301 1  C; 12317 1  C; 00451 1  C; 30523 0  C; 00147 0    00006 1
07,2250    30025 0    53567 0    06060 1  C; 00100 0    02311 0    06112 0  I; 45345 1  C; 02167 0
07,2260  C; 02047 0  I; 45240 0  C; 16274 1  C; 16220 0  I; 66240 1  C; 16274 1  C; 02201 0  C; 77776 1
07,2270  I; 77624 1  C; 16324 0  I; 77650 1  C; 16153 1  I; 77776 1    12544 1    00006 1    23627 0

07,2300    32370 1    55605 1    51605 0    31400 1    51605 0    55210 1    11605 1    12301 0
07,2310    01627 0    00006 1    23627 0    32370 1    55605 1    51605 0    31410 0    51605 0
07,2320    55400 0    11605 1    12314 1    01627 0  I; 66331 0  C; 02230 1  C; 17743 1  C; 02205 1
07,2330  C; 16153 1  I; 43014 0  C; 00262 1  C; 00263 0  I; 43414 1  C; 00260 0    53631 0    37763 1

07,2340    12343 0    53631 0    37770 0    55600 1    06060 1  C; 00100 0    02311 0    06112 0
07,2350  I; 77624 1  C; 16324 0  I; 77650 1  C; 16153 1  I; 77776 1    11600 1    12361 0    12361 0
07,2360    12471 0    06112 0  I; 77624 1  C; 17500 1  I; 77776 1    11600 1    12445 1    12421 0
07,2370  C; 00051 0    12372 1    06112 0  I; 66370 0  C; 00014 1  C; 00051 0  C; 00006 1  I; 73773 0
```

OCTAL LISTING OF PARAGRAPH # 055, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "E" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

07,2400	C; 02015 1	C; 16254 0	I; 76521 0	C; 01263 1	C; 06131 1	I; 71300 1	C; 16377 0	C; 02167 0
07,2410	C; 01307 1	C; 02111 1	I; 77615 0	C; 16216 0	C; 02167 0	I; 52131 0	C; 02201 0	C; 00000 1
07,2420	C; 16153 1	06112 0	I; 74375 0	C; 02001 1	C; 16240 0	I; 76521 0	C; 01263 1	C; 16131 0
07,2430	C; 02167 0	I; 43214 1	C; 02212 1	C; 16442 1	C; 16222 1	C; 02167 0	I; 52131 0	C; 02201 0
07,2440	C; 00001 0	C; 16153 1	I; 52015 1	C; 16224 1	C; 16435 1	06076 0	C; 00100 0	06112 0
07,2450	I; 66370 0	C; 00014 1	C; 00051 0	C; 00006 1	I; 73773 0	C; 02015 1	C; 16254 0	I; 76521 0
07,2460	C; 01263 1	C; 06015 0	I; 77500 1	C; 16454 0	00006 1	31447 1	53777 0	53631 0
07,2470	52006 0	04161 0	C; 05021 1	C; 05000 1	02276 0	04161 0	C; 05021 1	C; 05000 1
07,2500	06112 0	I; 40575 1	C; 01225 0	I; 53342 1	C; 01241 1	C; 26001 1	C; 01233 1	I; 53202 1
07,2510	C; 01247 1	C; 02007 1	I; 66370 0	C; 00014 1	C; 00051 0	C; 00006 1	I; 73773 0	C; 02015 1
07,2520	C; 16254 0	I; 76521 0	C; 01263 1	C; 06015 0	I; 77700 0	C; 16516 1	I; 77776 1	00004 0
07,2530	31764 0	54070 1	50070 0	31400 1	50070 0	55010 0	10070 1	12531 0
07,2540	00006 1	31257 0	53327 1	00003 1	06076 0	C; 00100 0	04161 0	C; 00001 0
07,2550	05567 0	I; 50545 0	C; 02165 1	I; 43262 0	C; 02045 1	C; 16161 0	C; 17755 0	I; 54205 1
07,2560	C; 02163 1	C; 21615 0	I; 77615 0	C; 02047 0	C; 02047 0	I; 40375 1	C; 02001 1	C; 00001 0
07,2570	I; 65256 0	C; 00045 0	I; 77715 1	C; 02007 1	I; 61436 1	I; 45205 1	C; 00007 0	C; 17702 1
07,2600	I; 41532 0	I; 57502 1	I; 56215 1	C; 17702 1	C; 00007 0	I; 50315 0	C; 02001 1	C; 02007 1
07,2610	I; 63306 1	C; 02031 1	I; 50256 0	C; 02037 1	I; 77725 1	C; 00045 0	C; 16155 1	C; 02163 1
07,2620	I; 54442 1	I; 77071 1	C; 02155 1	C; 00012 1	I; 56325 0	C; 17702 1	C; 02155 1	I; 57225 0
07,2630	C; 00013 0	C; 00021 1	I; 57275 0	C; 00021 1	C; 17704 1	I; 52452 0	I; 57325 1	C; 00017 1
07,2640	C; 00021 1	I; 41412 0	I; 57221 1	C; 17730 0	I; 45221 1	C; 17730 0	I; 76405 1	I; 66215 1
07,2650	C; 02051 1	C; 00052 0	C; 00001 0	C; 02051 1	I; 61516 1	I; 66405 0	C; 00013 0	I; 45001 1
07,2660	C; 00021 1	C; 16751 0	I; 42405 0	C; 02051 1	I; 72405 0	C; 02051 1	I; 76405 1	C; 02051 1
07,2670	C; 00030 1	I; 65275 1	C; 00011 1	C; 02051 1	I; 42405 0	C; 00021 1	I; 41352 0	C; 02051 1
07,2700	I; 77732 1	C; 00026 0	I; 74405 0	C; 00015 0	I; 77615 0	I; 57325 1	C; 00007 0	C; 02051 1
07,2710	I; 77615 0	I; 44206 0	C; 02161 0	C; 00021 1	I; 77776 1	06112 0	I; 45246 0	C; 17674 1
07,2720	I; 61040 1	C; 17036 1	C; 16725 0	I; 77650 1	C; 17036 1	I; 41345 0	C; 00013 0	C; 00030 1
07,2730	I; 44332 0	C; 02051 1	I; 46405 1	C; 00015 0	C; 14023 0	C; 00026 0	I; 76405 1	C; 00011 1
07,2740	I; 77615 0	I; 65215 1	C; 00007 0	C; 00021 1	I; 43271 1	C; 00023 0	C; 02051 1	C; 36051 0
07,2750	C; 16654 1	C; 00043 0	I; 63434 1	C; 17000 1	I; 41506 1	C; 00045 0	I; 76405 1	C; 00043 0
07,2760	I; 57221 1	C; 17702 1	C; 00045 0	I; 64525 1	I; 47125 1	C; 00043 0	C; 17017 1	I; 61516 1
07,2770	I; 57325 1	C; 00043 0	C; 00045 0	I; 57221 1	C; 17706 0	I; 43415 0	C; 74631 0	C; 63145 1

OCTAL LISTING OF PARAGRAPH # 056, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

07,3000	07274 1	C; 00004 0	C; 26501 1	C; 07463 1	C; 60724 0	C; 60210 1	C; 03010 0	C; 26256 1
07,3010	C; 77554 0	C; 74242 0	C; 00010 0	C; 05475 1	C; 77777 0	C; 66460 0	06125 1	07274 1
07,3020	C; 00004 0	C; 32101 0	C; 17270 1	C; 65431 1	C; 40174 1	C; 01710 0	C; 10660 0	C; 77676 0
07,3030	C; 52270 0	C; 00004 0	C; 21652 0	C; 77777 0	C; 71323 0	06125 1	I; 40345 1	C; 00026 0
07,3040	C; 00032 0	I; 74276 1	C; 00001 0	I; 45325 1	C; 00023 0	C; 00030 1	I; 74312 1	C; 02007 1
07,3050	I; 76455 1	I; 53206 0	C; 02001 1	I; 45455 1	C; 75746 0	I; 77646 0	C; 14021 1	C; 00013 0
07,3060	I; 66405 0	C; 00030 1	I; 56225 1	C; 02051 1	C; 00021 1	I; 72561 0	C; 00001 0	I; 70525 1
07,3070	C; 00021 1	I; 56225 1	C; 00026 0	C; 00021 1	I; 53361 0	C; 02007 1	I; 77772 0	C; 36037 0
07,3100	C; 02171 1	I; 77331 0	C; 02207 0	C; 00004 0	C; 02053 0	I; 53261 1	C; 20613 1	C; 02031 1
07,3110	I; 43154 0	C; 02205 1	C; 00340 0	C; 17115 1	C; 12111 0	I; 66331 0	C; 02210 0	C; 00016 0
07,3120	C; 02173 0	C; 00002 0	C; 02061 1	I; 53575 0	C; 02053 0	C; 16053 0	C; 00045 0	C; 02155 1
07,3130	I; 77600 1	C; 17132 1	I; 74575 0	C; 02061 1	I; 40236 1	C; 00001 0	I; 61501 1	C; 00051 0
07,3140	I; 60325 0	C; 02155 1	C; 00047 1	I; 63342 1	C; 02061 1	I; 77656 1	C; 16061 1	C; 00045 0
07,3150	C; 02157 0	I; 55301 0	C; 00050 1	I; 41562 0	I; 57144 1	C; 00047 1	C; 02206 1	I; 55074 1
07,3160	C; 00046 0	C; 02207 0	I; 53714 0	C; 00002 0	C; 57176 0	I; 64406 1	I; 50315 0	C; 02053 0
07,3170	C; 02061 1	I; 44372 1	I; 57206 1	C; 00005 1	I; 43206 1	C; 17702 1	I; 75406 1	I; 41475 1
07,3200	C; 00013 0	I; 43352 1	C; 17702 1	I; 43325 1	C; 00013 0	C; 17730 0	I; 72475 1	C; 00011 1
07,3210	I; 56215 1	C; 17676 0	C; 00017 1	I; 74275 1	C; 00007 0	C; 02061 1	I; 64515 1	C; 02053 0
07,3220	I; 41455 0	I; 41345 0	C; 00001 0	C; 00015 0	I; 61501 1	C; 00052 0	I; 70065 0	C; 00003 1
07,3230	C; 00047 1	I; 56070 0	C; 00051 0	C; 00050 1	I; 56070 0	C; 02207 0	C; 02207 0	I; 74276 1
07,3240	C; 00021 1	I; 73206 1	C; 02173 0	C; 17244 0	C; 17315 0	C; 17276 1	C; 17247 0	I; 77657 0
07,3250	C; 20240 0	C; 26103 1	C; 02061 1	C; 16053 0	C; 02157 0	C; 02155 1	I; 45014 0	C; 00342 1
07,3260	C; 17322 1	C; 17735 0	C; 02061 1	I; 43150 1	C; 02205 1	C; 00340 0	C; 17270 1	C; 06117 0
07,3270	I; 65174 0	C; 00023 0	C; 02207 0	I; 52134 0	C; 02206 1	C; 17132 1	I; 45144 1	C; 02227 1
07,3300	C; 17434 1	I; 77624 1	C; 17737 1	I; 76750 1	C; 02205 1	C; 02117 1	I; 53357 0	C; 77770 1
07,3310	I; 66170 1	C; 00034 0	C; 02207 0	C; 36061 0	C; 17132 1	I; 63144 0	C; 02227 1	C; 77774 0
07,3320	I; 77624 1	C; 17434 1	I; 77614 1	C; 00303 1	C; 17422 0	I; 77745 1	C; 02057 1	I; 57201 0
07,3330	C; 00001 0	C; 17712 0	I; 63525 0	C; 02057 1	I; 57252 0	C; 17710 1	I; 41425 1	C; 17676 0
07,3340	I; 57275 0	C; 02057 1	C; 17716 1	I; 65352 0	C; 00001 0	I; 44275 1	C; 17734 1	I; 57206 1
07,3350	C; 02057 1	I; 65275 1	C; 17720 1	C; 00003 1	I; 44275 1	C; 17722 0	I; 62405 1	C; 17726 1
07,3360	I; 43271 1	C; 02155 1	C; 00005 1	I; 56275 1	C; 17724 0	C; 02155 1	I; 74415 1	C; 00003 1
07,3370	C; 02053 0	C; 16053 0	I; 72405 0	C; 17726 1	I; 43271 1	C; 02155 1	I; 50525 0	C; 17724 0

OCTAL LISTING OF PARAGRAPH # 057, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

07,3400	I; 77675 0	I; 43271 1	C; 02155 1	I; 77621 1	C; 02057 1	C; 16057 1	C; 02155 1	I; 63516 0
07,3410	I; 55301 0	C; 00047 1	C; 17714 0	I; 62161 0	C; 02053 0	C; 00004 0	I; 53457 1	C; 20201 0
07,3420	C; 02103 1	C; 02103 1	I; 72135 0	C; 02206 1	C; 00144 0	I; 73205 1	C; 16777 1	C; 00145 1
07,3430	C; 17431 1	C; 17526 0	C; 17532 0	C; 17543 0	I; 77743 1	C; 77776 1	C; 24051 0	C; 00027 1
07,3440	I; 73670 1	C; 00050 1	C; 77775 1	I; 53257 1	C; 20240 0	C; 02103 1	C; 02103 1	I; 77616 0
07,3450	I; 77775 1	C; 02023 1	C; 26222 1	C; 02015 1	C; 02214 1	I; 45246 0	C; 17730 0	I; 45040 1
07,3460	C; 17462 1	C; 17500 1	I; 66331 0	C; 02171 1	C; 16551 1	C; 02172 1	C; 17101 1	I; 77614 1
07,3470	C; 00261 1	I; 77775 1	C; 02214 1	C; 16053 0	C; 17732 1	C; 02165 1	C; 36206 0	C; 02171 1
07,3500	I; 40575 1	C; 02015 1	I; 53342 1	C; 02031 1	C; 02001 1	C; 26031 1	C; 02023 1	I; 53202 1
07,3510	C; 02037 1	C; 02007 1	I; 66370 0	C; 00014 1	C; 00051 0	C; 00002 0	C; 16037 1	C; 17732 1
07,3520	C; 02045 1	C; 02051 1	C; 06230 0	C; 06031 0	I; 43500 0	C; 17522 1	I; 64575 1	C; 02103 1
07,3530	C; 36067 0	C; 17635 1	I; 74575 0	C; 02103 1	I; 53206 0	C; 02067 1	C; 26075 1	I; 53362 0
07,3540	C; 02067 1	C; 36067 0	C; 17635 1	I; 57345 1	C; 02165 1	C; 17734 1	I; 74206 0	C; 02067 1
07,3550	I; 53372 1	C; 02222 1	I; 53361 0	C; 02165 1	C; 02214 1	C; 26214 1	C; 02103 1	I; 53322 1
07,3560	C; 02075 1	I; 76561 1	I; 43055 0	C; 02222 1	C; 00341 1	C; 17605 1	I; 77770 1	C; 00000 1
07,3570	C; 12341 1	I; 77745 1	C; 02214 1	C; 12275 1	I; 52104 0	C; 17577 1	C; 02204 0	I; 77773 1
07,3600	C; 75502 1	C; 32214 1	C; 75436 1	C; 36222 0	C; 17471 0	C; 26023 1	C; 02214 1	C; 16015 1
07,3610	C; 02165 1	I; 64402 0	I; 77615 0	C; 02045 1	C; 02045 1	I; 77014 1	C; 00340 0	C; 02204 0
07,3620	C; 00044 1	I; 76131 0	C; 00052 0	C; 00006 1	C; 17655 1	I; 66130 0	C; 02170 0	C; 02171 1
07,3630	I; 76014 0	C; 00161 1	C; 00000 1	I; 77650 1	C; 17577 1	I; 43345 1	C; 02163 1	C; 02165 1
07,3640	I; 66110 1	C; 77763 0	C; 02205 1	C; 02165 1	I; 74561 0	C; 02103 1	I; 74255 0	C; 02222 1
07,3650	C; 02165 1	I; 77655 1	C; 02214 1	C; 36053 1	C; 02170 0	I; 50575 0	C; 02053 0	I; 53513 0
07,3660	C; 02111 1	I; 46315 1	C; 02053 0	I; 52361 1	C; 17700 0	I; 41325 0	C; 00043 0	C; 00045 0
07,3670	I; 45541 0	C; 41674 1	C; 17422 0	C; 00000 1	C; 00002 0	C; 14000 1	C; 00000 1	C; 06000 1
07,3700	C; 00000 1	C; 10000 0	C; 00000 1	C; 12525 0	C; 12525 0	C; 02000 0	C; 00000 1	C; 36000 1
07,3710	C; 00000 1	C; 30000 1	C; 00000 1	C; 12577 1	C; 24106 0	C; 22525 0	C; 12525 0	C; 22000 1
07,3720	C; 00000 1	C; 01200 1	C; 00000 1	C; 77711 0	C; 71033 1	C; 23377 0	C; 06703 0	C; 20000 0
07,3730	C; 00000 1	C; 00000 1	C; 00000 1	C; 25252 0	C; 25253 1	I; 43575 1	C; 17744 0	I; 77201 1
07,3740	C; 00001 0	C; 17747 0	I; 77616 0	C; 00006 1	C; 00000 1	C; 00000 1	C; 00012 1	C; 00000 1
07,3750	C; 00000 1	C; 00000 1	C; 00000 1	C; 17743 1	C; 24214 0	C; 11244 0	C; 03756 0	C; 03757 1
07,3760	CKSM 12336 1	@	@	@	@	@	@	@
07,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 060, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "E" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

10,2000	02013 1	05701 1	C; 00144 0	47763 0	70412 1	54412 1	40074 0	77755 0
10,2010	10000 0	15727 1	13242 1	00006 1	23464 0	37763 1	00006 1	05012 1
10,2020	05701 1	C; 00002 0	37767 0	54035 0	54036 0	47763 0	00006 1	03012 1
10,2030	05701 1	C; 00620 0	47747 0	70412 1	54412 1	30035 1	04323 1	C; 57777 1
10,2040	12043 0	37767 0	12044 1	37750 1	56412 0	75502 1	26412 1	04377 0
10,2050	01464 0	02106 1	37763 1	70412 1	10000 0	12060 1	04755 1	C; 00501 0
10,2060	05701 1	C; 00002 0	37750 1	70412 1	10000 0	37745 0	02150 1	37750 1
10,2070	70412 1	10000 0	47746 1	02153 1	47751 1	70412 1	54412 1	77752 1
10,2100	10000 0	12423 1	47762 1	00006 1	03012 1	15727 1	37762 0	00006 1
10,2110	05012 1	37767 0	54361 1	54362 1	00002 0	37750 1	70412 1	10000 0
10,2120	37745 0	02150 1	32137 0	02153 1	40412 1	77750 0	10000 0	32141 1
10,2130	62140 0	02150 1	02142 1	47746 1	70412 1	54412 1	02432 0	C; 70000 0
10,2140	C; 67070 1	C; 61615 1	22412 0	37750 1	00006 1	06001 0	54412 1	00002 0
10,2150	55465 0	37767 0	12155 0	55465 0	37763 1	55466 0	00006 1	23464 0
10,2160	12163 0	05701 1	C; 00062 0	40412 1	75645 1	00006 1	12074 1	31465 1
10,2170	00006 1	51466 1	20035 0	54002 1	00006 1	72212 0	54001 1	30002 0
10,2200	04323 1	C; 77644 1	12204 1	01464 0	11466 0	12207 1	56001 0	52423 0
10,2210	02213 0	12161 1	C; 22715 1	22002 0	37763 1	54062 1	50000 1	30422 0
10,2220	54061 1	04323 1	C; 77177 0	12242 0	30061 0	50062 0	56361 0	40000 0
10,2230	60061 0	67770 0	50062 0	54053 0	10062 1	12215 1	35634 0	00006 1
10,2240	05014 1	00001 0	10061 1	42222 0	12246 1	32222 1	54061 1	12225 1
10,2250	00004 0	47755 0	70074 0	67755 1	54074 0	37763 1	70412 1	10000 0
10,2260	12303 1	37751 0	70412 1	10000 0	13224 1	47747 0	70412 1	67747 1
10,2270	54412 1	37763 1	05663 1	C; 02305 0	C; 20063 0	40412 1	77762 1	10000 0
10,2300	12303 1	04755 1	C; 00510 0	00003 1	15221 1	02013 1	13242 1	I; 43020 1
10,2310	C; 00426 1	C; 00271 0	I; 66234 1	C; 33473 1	C; 00051 0	C; 00024 1	C; 24025 0	C; 00415 1
10,2320	C; 34041 0	C; 32531 1	I; 77624 1	C; 33355 1	I; 77776 1	00004 0	04334 1	C; 00422 0
10,2330	12352 0	24426 1	32351 1	54427 1	37752 0	26412 1	77751 1	10000 0
10,2340	12346 0	02106 1	37762 0	05663 1	C; 02423 0	C; 20063 0	00003 1	30426 1
10,2350	15230 1	C; 00074 1	02142 1	04334 1	C; 00424 0	12362 0	02142 1	37746 0
10,2360	26412 1	12331 0	02142 1	12346 0	05235 0	54426 0	00004 0	04334 1
10,2370	C; 00422 0	12403 0	00003 1	06112 0	I; 77624 1	C; 33430 0	C; 00415 1	I; 77414 0

OCTAL LISTING OF PARAGRAPH # 061, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

10,2400	C: 00071 1	00004 0	12332 0	02142 1	04334 1	C: 00422 0	12413 1	02142 1
10,2410	37746 0	26412 1	12372 1	37763 1	05663 1	C: 03256 0	C: 20063 0	02142 1
10,2420	04755 1	C: 00502 0	12347 1	37746 0	70412 1	10000 0	12115 1	12432 1
10,2430	05701 1	C: 00062 0	37751 0	70412 1	10000 0	12455 0	10412 1	12442 0
10,2440	12442 0	12462 1	40412 1	77752 1	10000 0	13242 1	10427 1	12461 1
10,2450	04755 1	C: 00503 1	42467 1	00006 1	03012 1	47752 1	70412 1	54412 1
10,2460	13256 1	54427 1	35650 1	05516 0	C: 02470 0	C: 20063 0	12430 0	C: 20002 1
10,2470	00006 1	30036 1	52423 0	06112 0	I: 77775 1	C: 00415 1	C: 00041 1	I: 47014 1
10,2500	C: 00311 1	C: 20510 1	C: 33473 1	I: 77731 1	C: 00051 0	C: 00024 1	C: 34025 1	C: 32531 1
10,2510	I: 67201 0	C: 00001 0	C: 00424 0	I: 41434 1	C: 33457 1	I: 65356 1	I: 41546 0	I: 65205 0
10,2520	C: 00041 1	C: 00045 0	I: 44205 0	C: 00001 0	I: 77626 0	C: 77353 1	I: 47135 0	C: 00423 1
10,2530	C: 33457 1	I: 71406 0	I: 73525 1	I: 41206 0	C: 00003 1	I: 65352 0	C: 00005 1	I: 41325 0
10,2540	C: 00007 0	C: 00001 0	I: 55552 0	I: 77441 0	C: 00041 1	40144 1	54422 1	40412 1
10,2550	77750 0	10000 0	12555 1	40423 0	54423 0	37767 0	54145 0	37763 1
10,2560	54144 1	50000 1	30422 0	00006 1	72636 1	50144 0	56422 0	04323 1
10,2570	C: 77715 1	24145 1	10144 1	12560 1	00004 0	10412 1	12601 0	12601 0
10,2600	12626 0	10145 0	12626 0	40074 0	77757 1	10000 0	12617 1	37746 0
10,2610	00006 1	05012 1	37760 1	00006 1	02033 0	10000 0	12631 0	47752 1
10,2620	70412 1	54412 1	47762 1	00006 1	03012 1	15567 1	47746 1	00006 1
10,2630	03012 1	40412 1	77751 1	10000 0	02213 0	15567 1	C: 21122 0	02653 0
10,2640	C: 00017 1	02654 1	C: 00016 0	02654 1	C: 00015 0	02654 1	C: 00014 1	02653 0
10,2650	C: 00012 1	02653 0	C: 00011 1	37763 1	00004 0	54420 0	00006 1	77761 1
10,2660	52421 1	10000 0	54424 1	67763 1	54413 0	32707 0	00006 1	02033 0
10,2670	54426 0	42640 0	00006 1	03013 0	50002 0	30000 1	00006 1	05013 0
10,2700	00006 1	30025 0	20421 1	37767 0	54001 1	52415 0	12303 1	C: 00230 0
10,2710	54016 1	00006 1	22012 1	00006 1	30036 1	52417 1	10413 0	12731 1
10,2720	12724 0	04755 1	C: 00520 0	05733 0	04755 1	C: 00521 1	47763 0	54413 0
10,2730	03254 1	54413 0	37761 0	00006 1	02013 1	00006 1	13015 1	30412 0
10,2740	00006 1	06033 1	77756 0	00006 1	12750 0	04755 1	C: 00522 1	02726 0
10,2750	36311 1	00006 1	06013 0	76311 0	00006 1	13011 0	37743 0	70046 1
10,2760	63157 1	54001 1	30046 0	60000 1	77763 0	52064 1	37754 0	03127 0
10,2770	10424 1	03001 0	47763 0	54413 0	40061 1	70412 1	54412 1	04377 0

OCTAL LISTING OF PARAGRAPH # 062. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

10,3000	03247 0	54424 1	10413 0	13005 0	13146 0	37760 1	00006 1	05013 0
10,3010	05733 0	37757 0	54061 1	37753 1	03037 0	37751 0	70412 1	10000 0
10,3020	12726 1	40412 1	77755 0	10000 0	12726 1	37760 1	54061 1	37763 1
10,3030	00006 1	02013 1	54002 1	10000 0	13036 0	13050 0	37761 0	54001 1
10,3040	00006 1	02033 0	56001 0	70412 1	00006 1	06001 0	10000 0	03067 0
10,3050	37743 0	70046 1	54064 1	30046 0	60000 1	77763 0	54063 0	10002 1
10,3060	13101 0	00006 1	43161 0	20064 1	30061 0	03130 0	02772 1	22412 0
10,3070	67763 1	00006 1	06001 0	54412 1	32707 0	00006 1	02033 0	54426 0
10,3100	12726 1	10001 1	13104 0	13064 1	52064 1	20001 1	20001 1	20001 1
10,3110	52064 1	37761 0	00006 1	02013 1	00006 1	13064 1	33156 0	00006 1
10,3120	70064 1	54064 1	37767 0	56063 1	00006 1	73156 1	13063 0	54061 1
10,3130	00006 1	02033 0	54001 1	40061 1	70426 0	60001 0	56426 1	70061 1
10,3140	60001 0	10000 0	03002 0	52064 1	20415 0	00002 0	40061 1	70412 1
10,3150	60061 0	54412 1	52064 1	52415 0	04377 0	12724 0	C; 23773 0	C; 47777 0
10,3160	C; 00001 0	C; 01150 1	00004 0	47756 0	70412 1	67756 1	54412 1	37755 1
10,3170	00006 1	02033 0	00006 1	13224 1	37747 1	00006 1	05012 1	33241 0
10,3200	05663 1	C; 03237 1	C; 20063 0	02303 0	54413 0	05701 1	C; 00144 0	37755 1
10,3210	00006 1	02033 0	00006 1	13231 0	10413 0	13204 0	47747 0	00006 1
10,3220	03012 1	04755 1	C; 00523 0	13256 1	37763 1	05663 1	C; 03451 1	C; 20063 0
10,3230	02303 0	05701 1	C; 00144 0	47747 0	00006 1	03012 1	13251 0	37757 0
10,3240	13204 0	C; 01130 1	37755 1	70412 1	10000 0	13251 0	13256 1	47767 1
10,3250	55076 0	37762 0	05225 1	C; 26720 0	47767 1	55076 0	37762 0	05225 1
10,3260	C; 26715 0	11445 1	13264 0	15727 1	05663 1	C; 03261 1	C; 20067 1	35647 1
10,3270	05505 1	C; 03301 0	C; 20067 1	33332 0	00006 1	71444 0	61443 0	55441 0
10,3300	15727 1	03333 1	05206 0	C; 26745 0	25446 0	00004 0	52415 0	51444 1
10,3310	53450 0	52417 1	51444 1	53452 1	52421 1	51444 1	53454 1	41444 0
10,3320	61442 1	00006 1	13325 1	31444 1	66306 1	55444 0	11445 1	15567 1
10,3330	15567 1	13301 1	C; 05341 1	37763 1	54123 0	51441 1	33340 0	15212 1
10,3340	C; 20651 1	C; 20647 0	C; 20645 1	C; 20643 1	C; 20641 0	C; 20637 1	C; 03346 0	C; 03347 1
10,3350	CKSM 46613 1	@	@	@	@	@	@	@
10,3360	@	@	@	@	@	@	@	@
10,3370	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 064, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

11,2000	02070 1	02073 1	02204 0	02265 0	02066 0	12126 1	02414 1	02406 1
11,2010	02261 0	02261 0	02261 0	02261 0	02265 1	02302 1	02404 0	02326 1
11,2020	03121 0	03167 1	02634 1	12530 1	13266 1	13242 1	13246 0	13454 0
11,2030	13260 1	13262 0	13270 0	13252 0	13244 1	13301 1	13474 1	02066 0
11,2040	37761 0	70336 0	10000 0	02053 0	47761 1	00004 0	70336 0	67761 0
11,2050	54336 0	00003 1	00002 0	04571 0	05567 0	04724 1	02060 0	05567 0
11,2060	47761 1	00004 0	70336 0	54336 0	00003 1	00002 0	04571 0	02056 0
11,2070	02076 1	02110 0	02117 1	02076 1	02132 0	02234 0	47757 1	60273 1
11,2100	00006 1	12065 1	24002 0	62107 0	00006 1	12065 1	02066 0	C; 77757 1
11,2110	02040 1	05206 0	C; 26000 0	05206 0	C; 26751 0	02116 0	02056 0	02040 1
11,2120	05206 0	C; 20250 1	05206 0	C; 26745 0	12125 1	12056 1	02040 1	05206 0
11,2130	C; 21162 1	12122 0	02040 1	04644 0	32152 0	04657 1	04475 0	02055 0
11,2140	02154 0	32153 1	04657 1	04724 1	05206 0	C; 26065 0	05206 0	C; 26751 0
11,2150	02056 0	02056 0	C; 02522 0	C; 04100 1	32202 0	04657 1	04475 0	02055 0
11,2160	02141 1	02163 1	02141 1	56002 0	54144 1	32203 1	54120 0	37762 0
11,2170	54145 0	50000 1	56342 1	05206 0	C; 33602 0	10120 0	54120 0	10145 0
11,2200	02170 0	00144 0	C; 02523 1	C; 00402 1	02040 1	04644 0	32232 0	04657 1
11,2210	04475 0	02055 0	02213 0	32233 1	04657 1	04724 1	05206 0	C; 26252 0
11,2220	05206 0	C; 26751 0	02056 0	32300 0	05206 0	C; 26362 1	05206 0	C; 26751 0
11,2230	02056 0	02056 0	C; 02567 1	C; 04200 1	02040 1	04644 0	32255 1	04657 1
11,2240	04475 0	02055 0	02243 0	05206 0	C; 22760 0	32153 1	04657 1	00004 0
11,2250	37746 0	05516 0	C; 02256 1	C; 22065 1	12055 1	C; 02441 1	05206 0	C; 20364 1
11,2260	02122 1	04626 1	02060 0	05225 1	C; 12002 0	02040 1	04644 0	32232 0
11,2270	04657 1	04475 0	02055 0	02274 1	32301 1	04657 1	04724 1	12223 1
11,2300	C; 00403 0	C; 05400 0	32325 1	54113 0	04460 1	05567 0	04475 0	05567 0
11,2310	05567 0	00004 0	37767 0	54146 0	54001 1	52025 1	52145 0	52340 1
11,2320	20145 0	07327 0	52145 0	20025 1	05567 0	C; 02124 1	10302 1	12053 1
11,2330	04644 0	32403 1	54146 0	32402 0	04657 1	04475 0	05566 1	02331 1
11,2340	04117 1	C; 00005 1	00004 0	37746 0	05516 0	C; 02350 0	C; 22065 1	05567 0
11,2350	45343 1	61546 1	00006 1	62356 0	04571 0	02331 1	51546 1	32361 1
11,2360	05230 0	C; 22066 1	C; 50000 1	C; 50025 0	C; 30000 1	C; 50252 1	C; 50451 1	C; 22066 1
11,2370	C; 73351 1	C; 46556 0	C; 31347 0	C; 31605 0	C; 31143 0	C; 22410 1	C; 31636 0	C; 23007 1

OCTAL LISTING OF PARAGRAPH # 065, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

11,2400	C; 22066 1	C; 22066 1	C; 02101 0	C; 02546 1	05225 1	C; 77543 0	05225 1	C; 14736 0
11,2410	32477 1	54411 1	47763 0	12416 1	04644 0	35205 0	54146 0	00004 0
11,2420	42500 1	70412 1	54412 1	32500 0	00006 1	02033 0	26412 1	00003 1
11,2430	32451 0	54003 0	56146 1	55445 1	37767 0	55444 0	55446 1	32475 0
11,2440	55442 0	32476 0	04657 1	04475 0	05566 1	12501 0	04724 1	11445 1
11,2450	12454 1	C; 03441 0	05225 1	C; 21301 0	36306 1	71441 0	10000 0	12463 0
11,2460	55443 1	36306 1	12466 0	37762 0	55443 1	32474 1	55442 0	00004 0
11,2470	05663 1	C; 03261 1	C; 20067 1	05567 0	C; 00022 1	C; 00102 1	C; 02101 0	C; 02236 1
11,2500	C; 00444 0	00004 0	35647 1	05505 1	C; 03301 0	C; 20067 1	00003 1	37766 1
11,2510	55441 0	32527 0	04657 1	04622 0	04475 0	02522 0	12520 0	12511 1
11,2520	11441 0	12510 0	37767 0	55445 1	04117 1	C; 00000 1	05566 1	C; 03300 1
11,2530	00004 0	32564 1	05663 1	C; 02552 1	C; 22067 0	31310 1	55446 0	04161 0
11,2540	C; 40026 1	00004 0	40077 0	77762 1	26077 0	32562 1	55310 0	04161 0
11,2550	C; 00036 1	15567 1	32563 0	55401 1	47751 1	70077 0	54077 0	04161 0
11,2560	C; 00006 1	15727 1	C; 02237 0	C; 02354 1	C; 00764 1	02040 1	42631 0	00006 1
11,2570	03012 1	04644 0	32152 0	04657 1	04475 0	02055 0	02577 0	32632 1
11,2600	04657 1	37756 1	00006 1	05012 1	37762 0	00004 0	05663 1	C; 02612 0
11,2610	C; 22067 0	12055 1	37762 0	54002 1	50000 1	30400 0	00006 1	77747 0
11,2620	67770 0	50002 0	54050 0	10002 1	12613 0	32633 0	00006 1	05014 1
11,2630	15727 1	C; 00050 1	C; 04300 0	C; 70000 0	37763 1	00004 0	05663 1	C; 02644 0
11,2640	C; 22067 0	05567 0	05701 1	C; 00062 0	37762 0	55562 0	50000 1	31557 1
11,2650	00006 1	51562 1	06030 1	51562 1	72703 0	00006 1	12700 0	54002 1
11,2660	51562 1	23557 1	00006 1	06001 0	51562 1	55557 0	40000 0	56002 0
11,2670	70002 1	00006 1	12700 0	32706 1	61562 1	54071 0	40002 1	02724 1
11,2700	11562 0	12645 0	12642 1	C; 00017 1	C; 77777 0	C; 03777 0	C; 00030 1	02717 1
11,2710	C; 00016 0	05733 0	04644 0	32716 0	04657 1	05566 1	C; 01645 1	54071 0
11,2720	50002 0	30000 1	24002 0	56071 1	54070 1	00006 1	22072 1	35651 0
11,2730	05505 1	C; 02742 1	C; 22067 0	52071 0	50064 0	52145 0	30025 0	50064 0
11,2740	54146 0	00072 1	04644 0	00006 1	30145 1	52340 1	30146 1	54341 0
11,2750	32757 0	04444 1	12754 1	05566 1	32756 1	04654 1	C; 22743 1	C; 00535 1
11,2760	05235 0	54426 0	32527 0	04657 1	04622 0	04475 0	12771 0	37757 0
11,2770	12772 0	37767 0	00004 0	56074 1	73006 0	26074 0	77757 1	10000 0

OCTAL LISTING OF PARAGRAPH # 066, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

11,3000	13003 0	37745 0	26412 1	00003 1	30426 1	15230 1	C; 77157 1	33077 1
11,3010	04657 1	04475 0	13034 1	13014 0	33100 0	04657 1	04475 0	13034 1
11,3020	13021 0	00004 0	47763 0	54350 0	00006 1	30352 0	52364 1	37763 1
11,3030	05663 1	C; 03042 1	C; 22067 0	15566 0	04724 1	04117 1	C; 00000 1	05567 0
11,3040	05701 1	C; 00062 0	00006 1	30355 1	52062 1	00006 1	40364 1	20062 1
11,3050	10061 1	13071 0	13054 1	13075 1	10062 1	13071 0	13060 0	13075 1
11,3060	37767 0	54353 0	52355 0	52352 1	37746 0	05505 1	C; 03035 1	C; 22067 0
11,3070	15727 1	30353 1	00006 1	63060 1	13040 1	40353 0	13072 0	C; 02444 1
11,3100	C; 02564 1	00004 0	47752 1	70077 0	67752 0	54077 0	15567 1	00004 0
11,3110	47752 1	70077 0	54077 0	00006 1	30033 1	52767 0	30034 0	54770 0
11,3120	15567 1	35352 0	56003 1	00004 0	30025 0	55506 1	32706 1	55512 1
11,3130	41506 1	60025 0	00006 1	13140 0	00006 1	30025 0	53507 0	13146 0
11,3140	11512 1	03127 0	00003 1	10067 1	05532 0	03126 1	05026 0	53511 1
11,3150	00003 1	47760 0	70365 0	67760 1	54365 0	37760 1	00006 1	03012 1
11,3160	37760 1	00006 1	05012 1	37751 0	00006 1	05013 0	05567 0	35352 0
11,3170	56003 1	05026 0	53513 0	00003 1	31512 0	00006 1	61510 1	00006 1
11,3200	63223 1	06112 0	I; 45345 1	C; 01513 1	C; 01511 0	I; 47061 0	C; 21606 1	C; 33520 0
11,3210	I; 77615 0	C; 01507 1	C; 01513 1	I; 77776 1	00006 1	31513 1	52025 1	47751 1
11,3220	00006 1	03013 0	05567 0	00006 1	37743 0	53515 0	06112 0	I; 45345 1
11,3230	C; 01515 1	C; 01511 0	I; 54215 0	C; 01513 1	C; 21606 1	I; 77615 0	C; 01507 1	C; 01513 1
11,3240	I; 77776 1	03214 0	05225 1	C; 56000 1	05225 1	C; 16003 0	00004 0	05270 1
11,3250	C; 56204 1	15567 1	33311 1	03255 0	33312 1	54144 1	37763 1	03277 0
11,3260	33313 0	03263 0	33314 1	54144 1	37764 0	03277 0	33315 0	03271 0
11,3270	33316 0	54144 1	36311 1	03277 0	33317 1	54144 1	33320 0	54145 0
11,3300	03303 1	33321 1	54144 1	30076 0	77757 1	00006 1	12053 1	05206 0
11,3310	C; 54000 0	C; 00073 0	C; 00067 0	C; 00070 0	C; 00071 1	C; 00064 0	C; 00072 1	C; 00076 0
11,3320	C; 00016 0	C; 00075 0	C; 03322 1	C; 03323 0	CKSM 55106 0	@	@	@
11,3330	@	@	@	@	@	@	@	@
11,3340	@	@	@	@	@	@	@	@
11,3350	@	@	@	@	@	@	@	@
11,3360	@	@	@	@	@	@	@	@
11,3370	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 070, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

12,2000	54016 1	37767 0	00006 1	01010 1	50346 0	10000 0	10347 0	12011 1
12,2010	37765 1	54347 0	12030 1	34276 0	54346 1	31145 0	55144 0	47763 0
12,2020	55145 1	34274 1	12026 0	34276 0	54346 1	34275 0	54027 0	15735 1
12,2030	00006 1	22012 1	51144 1	11133 0	12056 1	12056 1	32147 1	54346 1
12,2040	34563 0	51144 1	71133 0	51144 1	55133 0	64277 1	00006 1	01010 1
12,2050	11144 0	12053 1	37765 1	55145 1	32150 1	12133 0	10326 1	02066 0
12,2060	02066 0	56326 0	74563 1	54326 1	64313 1	02126 0	10307 1	12072 1
12,2070	32107 0	12133 0	54307 1	47767 1	54073 1	56345 0	67770 0	54345 1
12,2100	50345 0	10313 1	10345 1	02076 1	02115 0	C; 00012 1	10073 1	C; 37764 0
12,2110	54307 1	12070 0	54073 1	32105 1	02077 0	67763 1	50345 0	54313 1
12,2120	74563 1	54073 1	54560 0	50345 0	74300 1	60073 0	00006 1	01010 1
12,2130	32146 0	54346 1	32151 0	54027 0	50347 1	12136 0	03166 0	03161 1
12,2140	12305 1	13161 0	15733 1	03161 1	12305 1	13161 0	C; 02023 1	C; 02013 1
12,2150	C; 37775 0	C; 37776 0	02225 0	47762 1	00006 1	03014 1	10351 1	12163 0
12,2160	12163 0	12167 1	54351 1	47763 0	52352 1	52364 1	12207 1	30353 1
12,2170	00006 1	72302 0	60364 0	54364 1	37767 0	26363 0	37743 0	67763 1
12,2200	60364 0	54364 1	37767 0	67743 0	60363 1	54363 0	12277 0	10363 0
12,2210	37745 0	60364 0	54060 0	32303 0	00006 1	05014 1	12276 1	02225 0
12,2220	37762 0	00006 1	05014 1	30353 1	12212 0	10350 0	12273 1	12230 0
12,2230	37756 1	00006 1	02030 0	10000 0	12273 1	10350 0	12237 1	12260 0
12,2240	37754 0	00006 1	05012 1	37767 0	54350 0	54362 1	54361 1	36306 1
12,2250	05663 1	C; 02254 0	C; 24066 1	02276 0	37762 0	00006 1	05012 1	05727 0
12,2260	40362 1	60357 0	54054 1	30357 0	54362 1	40361 1	60360 1	54053 0
12,2270	30360 1	54361 1	00002 0	42304 0	00006 1	03012 1	15733 1	37767 0
12,2300	54001 1	12165 0	C; 06432 1	C; 06004 0	C; 00202 1	30365 1	00006 1	06030 1
12,2310	73025 1	00006 1	12342 1	54070 1	22365 1	00006 1	06001 0	54365 0
12,2320	47763 0	56070 0	00006 1	62614 0	12326 0	67763 1	24070 0	60000 1
12,2330	54000 0	12326 0	56071 1	50070 0	37746 0	70365 0	50070 0	03021 1
12,2340	10071 0	12325 0	40365 0	77755 0	10000 0	12477 0	37754 0	70365 0
12,2350	10000 0	12355 1	37754 0	26365 0	12477 0	43044 0	70365 0	54365 0
12,2360	77746 1	10000 0	12455 0	40365 0	77753 0	10000 0	12371 1	04755 1
12,2370	C; 00213 1	03002 0	33052 0	05663 1	C; 02401 0	C; 24066 1	12477 0	33052 0

OCTAL LISTING OF PARAGRAPH # 071, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

12,2400	05704 1	47762 1	70365 0	56365 1	77762 1	00006 1	12421 0	37746 0
12,2410	70365 0	00006 1	12377 1	40074 0	77754 1	10000 0	15727 1	05225 1
12,2420	C; 26672 0	37745 0	00006 1	05012 1	05270 1	C; 26324 0	04314 0	43041 0
12,2430	00006 1	03012 1	34321 0	05704 1	43042 0	70365 0	54365 0	02753 1
12,2440	47745 1	00006 1	03012 1	37751 0	05663 1	C; 02310 1	C; 26066 0	40074 0
12,2450	77754 1	10000 0	15727 1	05225 1	C; 26664 1	37760 1	00006 1	02012 0
12,2460	10000 0	12477 0	37754 0	70074 0	10000 0	12477 0	03014 1	37757 0
12,2470	00006 1	05012 1	37756 1	05663 1	C; 02426 0	C; 24066 1	12477 0	30366 1
12,2500	75642 0	54001 1	35642 1	00006 1	03033 1	00006 1	06001 0	00006 1
12,2510	12537 0	54070 1	22366 1	00006 1	06001 0	54366 0	37767 0	56070 0
12,2520	60000 1	12524 1	67763 1	24070 0	60000 1	54000 0	12523 0	56071 1
12,2530	50070 0	37747 1	70366 0	50070 0	03027 1	10071 0	12522 1	10034 1
12,2540	12544 1	12564 0	12544 1	12564 0	62611 0	00006 1	62563 0	62612 0
12,2550	00006 1	62561 1	37760 1	00006 1	02012 0	10000 0	12561 0	05270 1
12,2560	C; 26232 0	37756 1	12564 0	37767 0	60326 0	77756 0	00006 1	15733 1
12,2570	70326 1	10000 0	12606 1	37756 1	70365 0	10000 0	15733 1	40326 1
12,2600	77756 0	67745 0	56326 0	72613 0	26326 1	15733 1	03032 0	15733 1
12,2610	12577 1	C; 63434 1	C; 75252 0	C; 37737 0	77743 1	54071 0	10365 0	12625 0
12,2620	12625 0	37760 1	00006 1	05011 1	12340 0	03032 0	12340 0	47760 0
12,2630	00006 1	03011 1	12340 0	37762 0	70365 0	10000 0	12340 0	37746 0
12,2640	70365 0	00006 1	12656 1	37745 0	00006 1	02012 0	00006 1	12651 0
12,2650	12340 0	37762 0	26365 0	04755 1	C; 00207 1	12340 0	47755 0	70365 0
12,2660	61755 1	54365 0	12340 0	10000 0	12340 0	43047 0	00006 1	03014 1
12,2670	03002 0	47767 1	54050 0	54051 1	54052 1	54047 0	43046 1	00006 1
12,2700	03014 1	12340 0	00006 1	12713 1	40074 0	77754 1	10000 0	12340 0
12,2710	04755 1	C; 00214 0	12340 0	37762 0	70365 0	10000 0	12340 0	12656 1
12,2720	10000 0	37752 0	56365 1	73051 1	26365 0	02753 1	40365 0	77763 0
12,2730	10000 0	12535 1	30365 1	73045 1	10000 0	12535 1	04755 1	C; 00212 0
12,2740	12535 1	10000 0	12535 1	04755 1	C; 01105 1	12535 1	10000 0	12535 1
12,2750	04755 1	C; 01106 1	12535 1	33037 0	70365 0	00006 1	77752 1	30365 1
12,2760	00006 1	04001 1	40000 0	75641 0	10000 0	12776 1	37763 1	70366 0
12,2770	10000 0	00002 0	47763 0	00006 1	03011 1	00002 0	37763 1	00006 1

OCTAL LISTING OF PARAGRAPH # 072, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "e" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

12,3000	05011 1	00002 0	43050 0	00006 1	03012 1	33041 1	00006 1	05012 1
12,3010	43040 1	70326 1	63040 0	54326 1	43043 1	70365 0	63043 0	54365 0
12,3020	00002 0	12633 1	12753 0	12753 0	12663 1	C; 76400 1	12702 1	12720 1
12,3030	12741 0	12746 1	40366 0	77763 0	10000 0	24002 0	00002 0	C; 00015 0
12,3040	C; 40010 1	C; 00030 1	C; 00054 0	C; 00075 0	C; 00300 1	C; 01720 0	C; 01700 1	C; 71000 1
12,3050	C; 40040 1	C; 76777 1	C; 21450 0	C; 00014 1	30412 0	00006 1	06033 1	77762 1
12,3060	00006 1	13115 0	22412 0	00006 1	06001 0	54412 1	77762 1	10000 0
12,3070	13107 0	37755 1	70074 0	10000 0	13115 0	43106 1	70412 1	63106 0
12,3100	54412 1	37763 1	05663 1	C; 02000 0	C; 20066 0	13161 0	C; 10001 1	40074 0
12,3110	77755 0	10000 0	13115 0	04755 1	C; 00514 1	30412 0	00006 1	06030 1
12,3120	77755 0	00006 1	13135 1	37762 0	70412 1	10000 0	13161 0	37755 1
12,3130	22412 0	00006 1	06001 0	54412 1	04377 0	33157 1	70412 1	10000 0
12,3140	13161 0	04334 1	C; 00035 1	13145 0	13161 0	37751 0	26412 1	43160 1
12,3150	00006 1	03012 1	37762 0	05663 1	C; 02051 1	C; 20066 0	13161 0	C; 32002 1
12,3160	C; 20002 1	00006 1	33165 0	52006 0	C; 02000 0	C; 40066 0	11162 1	05063 1
12,3170	47767 1	55162 1	47767 1	00006 1	06032 0	74564 0	57163 1	54071 0
12,3200	71163 0	54001 1	40101 0	70001 1	54072 0	40071 0	54001 1	41163 0
12,3210	70001 1	70101 0	26072 0	00006 1	15733 1	00006 1	33221 0	52006 0
12,3220	C; 02576 1	C; 54060 0	33455 0	56003 1	54153 1	11463 0	13431 0	13431 0
12,3230	13346 1	37761 0	54122 1	50122 0	31437 0	00006 1	50122 0	70403 1
12,3240	54002 1	30001 0	00006 1	77756 0	50122 0	54404 0	30002 0	00006 1
12,3250	77756 0	50122 0	20404 0	50122 0	41436 0	00006 1	70765 1	00006 1
12,3260	77760 0	50122 0	20404 0	10122 1	67771 1	13232 0	13267 0	55463 0
12,3270	54120 0	00006 1	40404 0	52145 0	31447 1	03351 0	00006 1	40406 1
12,3300	52145 0	41452 1	03351 0	41444 0	03400 0	00006 1	40406 1	52145 0
12,3310	31450 1	03351 0	00006 1	40410 0	52145 0	41453 0	03351 0	41445 1
12,3320	03400 0	00006 1	40406 1	52145 0	31454 0	03351 0	00006 1	40410 0
12,3330	52145 0	31451 0	03351 0	31446 0	03400 0	11463 0	13340 1	13346 1
12,3340	00004 0	35656 1	05505 1	C; 03433 0	C; 24063 1	00003 1	30153 0	54003 0
12,3350	15221 1	56144 0	00006 1	70144 1	52113 0	30145 1	00006 1	70144 1
12,3360	54001 1	37767 0	20113 0	30112 0	00006 1	77753 0	50120 1	21456 0
12,3370	30113 1	00006 1	77753 0	54001 1	37767 0	50120 1	21456 0	00002 0

OCTAL LISTING OF PARAGRAPH # 073, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

12,3400	00006 1	22121 0	00006 1	10765 1	22145 1	00006 1	77760 0	50120 1
12,3410	21456 0	30145 1	00006 1	17760 0	54001 1	37767 0	50120 1	21456 0
12,3420	37762 0	60120 1	56120 1	50000 1	11455 0	13427 1	00121 0	73477 1
12,3430	10000 0	55463 0	00121 0	37761 0	54120 0	50120 1	31456 1	00006 1
12,3440	77754 1	50120 1	55456 0	37767 0	50120 1	57455 1	00006 1	77754 1
12,3450	50120 1	21456 0	10120 0	67771 1	13434 0	C; 01455 1	33455 0	05206 0
12,3460	C; 26362 1	05206 0	C; 26751 0	15567 1	37761 0	54120 0	50120 1	31456 1
12,3470	00006 1	77754 1	50120 1	23456 1	10120 0	67771 1	13465 1	C; 77776 1
12,3500	15567 1	11463 0	13505 0	13505 0	15567 1	00004 0	10076 1	15567 1
12,3510	15567 1	13512 0	30025 0	56765 0	00003 1	40000 0	60765 0	10000 0
12,3520	67763 1	13526 1	13524 0	15567 1	40000 0	67743 0	00006 1	77752 1
12,3530	52113 0	00006 1	30113 1	52145 0	37767 0	55463 0	54120 0	41444 0
12,3540	03556 1	00006 1	40113 0	52145 0	31445 0	03556 1	00006 1	40113 0
12,3550	52145 0	41446 1	03556 1	11463 0	13433 1	15567 1	56902 0	54121 1
12,3560	30002 0	00006 1	70144 1	50120 1	21456 0	30002 0	00006 1	70145 0
12,3570	54001 1	37767 0	50120 1	21456 0	13420 0	11463 0	13601 1	13601 1
12,3600	15567 1	35652 0	56765 0	40000 0	61307 1	13517 0	33455 0	56003 1
12,3610	54153 1	37767 0	55463 0	55455 0	55456 0	55457 1	55460 0	55461 1
12,3620	55462 1	30153 0	54003 0	15221 1	C; 03624 1	C; 03625 0	CKSM 57574 0	@
12,3630	@	@	@	@	@	@	@	@
12,3640	@	@	@	@	@	@	@	@
12,3650	@	@	@	@	@	@	@	@
12,3660	@	@	@	@	@	@	@	@
12,3670	@	@	@	@	@	@	@	@
12,3700	@	@	@	@	@	@	@	@
12,3710	@	@	@	@	@	@	@	@
12,3720	@	@	@	@	@	@	@	@
12,3730	@	@	@	@	@	@	@	@
12,3740	@	@	@	@	@	@	@	@
12,3750	@	@	@	@	@	@	@	@
12,3760	@	@	@	@	@	@	@	@
12,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 074, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

13,2000	00004 0	40326 1	72777 0	10000 0	12010 0	04755 1	C; 00206 0	12712 0
13,2010	47754 1	70074 0	67754 0	54074 0	02701 0	12043 0	42776 1	70365 0
13,2020	62776 0	54365 0	42777 0	00006 1	03012 1	02324 0	37757 0	00006 1
13,2030	05012 1	37756 1	05663 1	C; 02045 1	C; 26063 0	40365 0	77753 0	10000 0
13,2040	12043 0	04755 1	C; 00210 1	00003 1	15221 1	02701 0	15727 1	04314 0
13,2050	47757 1	00006 1	03012 1	34321 0	05704 1	02701 0	15727 1	42776 1
13,2060	70365 0	54365 0	05270 1	C; 24753 0	12664 0	00004 0	02232 0	36306 1
13,2070	05663 1	C; 02074 0	C; 26063 0	12043 0	02674 0	37756 1	00006 1	05012 1
13,2100	37762 0	55460 0	51460 1	30400 0	00006 1	51460 1	20032 1	00006 1
13,2110	77747 0	56001 0	60000 1	54061 1	12116 1	26001 1	51460 1	23455 1
13,2120	11460 0	02101 0	37762 0	05704 1	02674 0	54061 1	37762 0	55460 0
13,2130	51460 1	11455 0	02136 1	02145 0	02211 1	02145 0	63002 0	00006 1
13,2140	62221 1	51460 1	55455 0	43003 0	24061 0	67770 0	51460 1	54050 0
13,2150	11460 0	02127 1	10061 1	12225 1	05701 1	C; 00226 1	37762 0	54061 1
13,2160	50000 1	30032 0	00006 1	50061 0	20400 1	10000 0	12202 1	12171 0
13,2170	12202 1	10061 1	12157 1	55455 0	55456 0	55457 1	55460 0	55461 1
13,2200	55462 1	12664 0	62210 0	00006 1	62171 1	04755 1	C; 00211 0	12672 1
13,2210	C; 77511 1	63002 0	00006 1	62221 1	40000 0	51460 1	55455 0	33003 1
13,2220	02144 1	37767 0	51460 1	57455 1	02144 1	33001 0	00006 1	05014 1
13,2230	33004 0	12123 1	47756 0	00006 1	03012 1	37760 1	00006 1	05012 1
13,2240	42251 1	70326 1	62251 0	54326 1	47760 0	70365 0	67760 1	54365 0
13,2250	00002 0	C; 40010 1	00004 0	02706 1	43000 0	00006 1	03012 1	02324 0
13,2260	37752 0	05663 1	C; 02273 0	C; 26063 0	34321 0	05663 1	C; 02271 1	C; 26063 0
13,2270	12043 0	02674 0	12664 0	02701 0	37767 0	37760 1	00006 1	02012 0
13,2300	10000 0	15727 1	47760 0	70365 0	54365 0	05270 1	C; 24753 0	15727 1
13,2310	02701 0	15727 1	47752 1	70365 0	67752 0	54365 0	47747 0	70366 0
13,2320	67747 1	54366 0	47757 1	12303 1	42251 1	70326 1	67745 0	54326 1
13,2330	00002 0	02701 0	15221 1	00004 0	37767 0	54037 1	54040 1	54041 0
13,2340	47763 0	70365 0	54365 0	05270 1	C; 24753 0	12043 0	00004 0	47763 0
13,2350	70365 0	67763 1	54365 0	47752 1	10000 0	12043 0	04755 1	C; 00212 0
13,2360	00004 0	12343 0	54151 0	02706 1	10356 0	02427 1	54146 0	37756 1
13,2370	00006 1	05014 1	37761 0	00004 0	05663 1	C; 02445 0	C; 26063 0	30151 1

OCTAL LISTING OF PARAGRAPH # 075, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

13,2400	56003 1	56151 1	54356 0	14564 0	54061 1	37762 0	54147 1	60000 1
13,2410	60061 0	54150 1	00006 1	50000 1	31401 0	52145 0	07327 0	52145 0
13,2420	50150 0	53401 1	10147 1	12406 0	30151 1	54003 0	12043 0	00006 1
13,2430	30124 0	52145 0	32444 1	15545 1	10356 0	12432 1	54146 0	00006 1
13,2440	30145 1	52124 1	37763 1	12373 0	C; 26434 0	42661 0	00006 1	03014 1
13,2450	02674 0	30356 1	00006 1	17760 0	50000 1	12456 0	02473 0	C; 00202 1
13,2460	02473 0	C; 00302 0	02471 1	C; 00100 0	37767 0	54356 0	32444 1	05551 0
13,2470	12271 0	47761 1	26356 0	50002 0	30000 1	54064 1	77765 0	67747 1
13,2500	26356 0	54003 0	14564 0	54061 1	47765 0	70064 1	54064 1	00006 1
13,2510	50061 0	31401 0	52071 0	10070 1	12527 1	12517 1	12642 1	10071 0
13,2520	12524 1	12451 1	12637 0	12451 1	62560 0	00006 1	62451 0	00006 1
13,2530	32663 0	20071 0	30064 0	00006 1	05014 1	35342 1	70071 0	56071 1
13,2540	00006 1	77754 1	54062 1	30070 0	00006 1	77753 0	54070 1	30001 0
13,2550	00006 1	77746 1	26062 1	00006 1	30071 1	67771 1	10000 0	12603 1
13,2560	C; 77600 1	12565 1	37746 0	26062 1	37767 0	50061 0	53401 1	30062 0
13,2570	54047 0	00006 1	77752 1	66311 1	05663 1	C; 02445 0	C; 26063 0	37752 0
13,2600	00006 1	05014 1	15727 1	50061 0	53401 1	37746 0	60062 0	54047 0
13,2610	00006 1	77752 1	65340 0	05663 1	C; 02617 0	C; 26063 0	12577 1	02674 0
13,2620	30356 1	54003 0	14564 0	54061 1	50061 0	11400 0	12632 0	37746 0
13,2630	26047 0	12571 1	50061 0	53400 0	37746 0	26047 0	12610 0	62560 0
13,2640	00006 1	62451 0	00006 1	42663 1	20071 0	30064 0	67753 1	00006 1
13,2650	05014 1	40070 1	54070 1	40071 0	75342 0	40000 0	56071 1	40000 0
13,2660	12540 0	C; 01700 1	C; 00000 1	C; 00034 0	00006 1	00011 1	77763 0	10000 0
13,2670	12672 1	12720 1	37767 0	12715 1	37756 1	70365 0	10000 0	12672 1
13,2700	00002 0	40365 0	77756 0	10000 0	24002 0	00002 0	40365 0	77756 0
13,2710	10000 0	00002 0	47767 1	54367 1	12043 0	54071 0	47767 1	12722 0
13,2720	54071 0	47763 0	54072 0	50071 1	10367 1	12727 0	12737 1	37767 0
13,2730	50071 1	56367 0	05551 0	40072 0	50064 0	26154 0	15727 1	30072 1
13,2740	50071 1	54367 1	15727 1	36311 1	12752 1	37762 0	12752 1	37763 1
13,2750	02752 0	37767 0	00004 0	54071 0	50000 1	10367 1	12774 0	12770 1
13,2760	12764 1	50071 1	54367 1	12043 0	10000 0	12774 0	24123 1	12761 1
13,2770	05235 0	50071 1	54367 1	15545 1	06000 1	C; 01210 0	C; 00014 1	C; 00050 1

OCTAL LISTING OF PARAGRAPH # 076, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

13,3000	C; 00070 0	C; 70000 0	C; 77500 1	C; 77477 0	C; 00074 1	00004 0	54071 0	10373 1
13,3010	03012 1	03015 0	04755 1	C; 00105 0	05567 0	10430 1	03031 0	10504 1
13,3020	03031 0	10560 0	03031 0	10634 1	03031 0	10710 0	03031 0	06000 1
13,3030	C; 01207 0	67762 0	54373 1	37767 0	54374 0	50373 0	53777 0	30071 1
13,3040	26373 1	35653 1	05505 1	C; 03054 0	C; 26063 0	02043 1	37767 0	56373 0
13,3050	10000 0	50000 1	54000 0	05221 0	37767 0	54374 0	37746 0	70373 1
13,3060	10000 0	03070 0	47751 1	70373 1	67751 0	54373 1	33415 1	03071 1
13,3070	33471 0	04657 1	04622 0	04475 0	03055 1	03055 1	37752 0	70373 1
13,3100	10000 0	03103 0	03107 1	37751 0	70373 1	10000 0	03115 1	04755 1
13,3110	C; 00111 0	45643 1	70373 1	54373 1	03054 0	47750 0	70373 1	67750 1
13,3120	54373 1	33467 1	04657 1	04475 0	03121 0	03121 0	46311 0	70374 0
13,3130	10000 0	03121 0	03135 0	03134 1	03121 0	36311 1	70374 0	10000 0
13,3140	03142 0	03121 0	35341 1	70373 1	54002 1	50374 1	31471 1	50002 0
13,3150	54011 0	50374 1	31466 1	50002 0	54010 1	31470 0	00006 1	50374 1
13,3160	21466 0	50002 0	54012 0	37746 0	70373 1	10000 0	03206 0	03170 1
13,3170	33470 1	04657 1	04475 0	03170 1	03170 1	35341 1	70373 1	54002 1
13,3200	30342 1	50002 0	54003 0	30343 0	50002 0	54005 0	35341 1	70373 1
13,3210	54373 1	00004 0	37763 1	05663 1	C; 03217 0	C; 26063 0	05567 0	37763 1
13,3220	12720 1	54016 1	30033 1	54063 0	30034 0	54064 1	30032 0	54065 0
13,3230	00006 1	30025 0	52062 1	56002 0	54012 0	33465 0	00006 1	02016 1
13,3240	10000 0	03243 1	03273 1	37750 1	70373 1	10000 0	05733 0	10373 1
13,3250	03254 1	04755 1	C; 00112 0	05733 0	37757 0	00006 1	02016 1	10000 0
13,3260	03421 0	37760 1	00006 1	02016 1	10000 0	03311 1	37761 0	00006 1
13,3270	02016 1	10000 0	03305 1	33466 0	00006 1	02016 1	00006 1	13302 1
13,3300	05225 1	C; 22707 1	04755 1	C; 00113 1	05733 0	37767 0	54070 1	37752 0
13,3310	03314 1	37763 1	54070 1	37751 0	54374 0	70373 1	10000 0	03321 1
13,3320	03324 1	04755 1	C; 00114 0	03355 1	35341 1	70373 1	54071 0	00006 1
13,3330	30062 0	50071 1	52001 1	30071 1	26070 1	30063 1	50070 0	54002 1
13,3340	30064 0	50070 0	54004 1	30065 1	50070 0	54006 0	37747 1	60374 1
13,3350	40000 0	70373 1	60374 1	54373 1	03355 1	37767 0	54073 1	37751 0
13,3360	70373 1	10000 0	03365 1	37754 0	54073 1	37752 0	70373 1	10000 0
13,3370	03373 0	37755 1	26073 1	35653 1	05505 1	C; 03403 0	C; 26063 0	30073 0

OCTAL LISTING OF PARAGRAPH # 077, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

13,3400	50064 0	54144 1	05733 0	10144 1	03407 1	33472 0	03411 0	33473 1
13,3410	60144 0	54113 0	30327 1	54154 0	04447 1	C; 05100 0	30154 1	54327 0
13,3420	05567 0	37746 0	70373 1	10000 0	03432 1	37752 0	70373 1	10000 0
13,3430	03454 1	03436 0	35632 0	70373 1	10000 0	03441 0	04755 1	C; 00115 1
13,3440	03454 1	47747 0	70373 1	67747 1	56373 0	77747 0	10000 0	03454 1
13,3450	40374 0	70373 1	54373 1	03355 1	45632 1	70373 1	56373 0	77746 1
13,3460	10000 0	03355 1	37751 0	26373 1	03355 1	C; 00034 0	C; 00140 1	C; 02143 0
13,3470	C; 02442 1	C; 05300 1	C; 02130 1	C; 05000 1	54016 1	56002 0	54012 0	04605 0
13,3500	34556 0	00006 1	02015 1	54073 1	35210 1	05505 1	C; 02002 1	C; 10060 0
13,3510	30073 0	50064 0	54144 1	05733 0	54016 1	56002 0	54012 0	04605 0
13,3520	37761 0	56045 0	54073 1	37761 0	00006 1	05011 1	34556 0	70073 1
13,3530	56073 0	56021 1	55076 0	03577 1	74556 1	63611 1	03606 1	03577 1
13,3540	74556 1	40000 0	03606 1	03573 0	43550 0	60073 0	10000 0	03556 1
13,3550	C; 00022 1	03556 1	47761 1	70075 1	54075 1	03562 0	37761 0	70075 1
13,3560	10000 0	05733 0	56073 0	03503 1	03573 0	47761 1	70075 1	67761 0
13,3570	54075 1	05733 0	05733 0	57076 1	60000 1	54021 0	00002 0	40021 0
13,3600	40021 0	40021 0	40021 0	40021 0	40000 0	00002 0	60073 0	10000 0
13,3610	03564 0	C; 77740 1	03564 0	00002 0	C; 03614 1	C; 03615 0	CKSM 07060 0	@
13,3620	@	@	@	@	@	@	@	@
13,3630	@	@	@	@	@	@	@	@
13,3640	@	@	@	@	@	@	@	@
13,3650	@	@	@	@	@	@	@	@
13,3660	@	@	@	@	@	@	@	@
13,3670	@	@	@	@	@	@	@	@
13,3700	@	@	@	@	@	@	@	@
13,3710	@	@	@	@	@	@	@	@
13,3720	@	@	@	@	@	@	@	@
13,3730	@	@	@	@	@	@	@	@
13,3740	@	@	@	@	@	@	@	@
13,3750	@	@	@	@	@	@	@	@
13,3760	@	@	@	@	@	@	@	@
13,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 100, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

14,2000	37763 1	55512 1	05206 0	C; 26000 0	06112 0	I; 77624 1	C; 30553 1	I; 77624 1	
14,2010	C; 30365 0	I; 45014 0	C; 00065 1	C; 30407 1	I; 77776 1	33700 0	04657 1	04475 0	
14,2020	12770 1	12015 0	56337 0	55544 1	10340 1	13003 0	02621 0	02524 0	
14,2030	02135 1	05206 0	C; 26751 0	12770 1	02247 1	02762 0	02752 0	05206 0	
14,2040	C; 26252 0	05206 0	C; 26751 0	12770 1	02135 1	04724 1	02263 1	05206 0	
14,2050	C; 30424 0	11512 1	12065 1	12047 1	12770 1	55512 1	00004 0	35644 1	
14,2060	05516 0	C; 03105 0	C; 30065 1	00003 1	02047 0	05026 0	52145 0	00003 1	
14,2070	37767 0	54037 1	54040 1	54041 0	55551 0	55537 0	02477 1	00004 0	
14,2100	33711 0	05663 1	C; 02106 1	C; 30065 1	32134 0	05545 0	32134 0	05551 0	
14,2110	05727 0	31542 0	55541 1	05206 0	C; 51737 0	00003 1	02477 1	31543 1	
14,2120	55541 1	05206 0	C; 51737 0	00003 1	02477 1	00004 0	33710 1	05663 1	
14,2130	C; 02106 1	C; 30065 1	32134 0	05545 0	C; 30111 0	00006 1	23546 1	05206 0	
14,2140	C; 27046 0	37763 1	54337 1	33674 1	04657 1	37767 0	05206 0	C; 27005 1	
14,2150	05206 0	C; 26747 1	12770 1	00006 1	50373 0	30001 0	53565 1	02242 1	
14,2160	06112 0	I; 45140 0	C; 00373 0	C; 33114 0	I; 45014 0	C; 00305 1	C; 30170 1	C; 32555 0	
14,2170	C; 02445 0	C; 02601 1	I; 77776 1	05206 0	C; 27046 0	37762 0	54337 1	33674 1	
14,2200	04657 1	37767 0	05206 0	C; 27005 1	37752 0	70074 0	10000 0	12215 1	
14,2210	05206 0	C; 30424 0	10370 1	12216 1	12210 1	12216 1	05206 0	C; 26747 1	
14,2220	12770 1	02242 1	06112 0	I; 45140 0	C; 00373 0	C; 33114 0	I; 45014 0	C; 00205 0	
14,2230	C; 30232 1	C; 32555 0	C; 02453 1	C; 02607 1	I; 77624 1	C; 30350 1	I; 77624 1	C; 32741 1	
14,2240	I; 77776 1	01546 1	37762 0	60373 0	50110 1	54050 0	00002 0	00006 1	
14,2250	23546 1	06112 0	I; 77624 1	C; 32655 0	I; 77776 1	05206 0	C; 26065 0	05206 0	
14,2260	C; 26751 0	12770 1	01546 1	00006 1	23546 1	06112 0	I; 64375 1	C; 02401 0	
14,2270	C; 02445 0	I; 43172 1	C; 00345 0	C; 30276 1	C; 34041 0	C; 32555 0	C; 26423 0	C; 02407 0	
14,2300	I; 76521 0	C; 02445 0	I; 77614 1	C; 00345 0	C; 30307 0	C; 34041 0	C; 32555 0	C; 26431 0	
14,2310	C; 02423 0	I; 76435 1	C; 02431 0	C; 36437 1	C; 32425 0	I; 47170 1	C; 02500 0	C; 33627 1	
14,2320	I; 77776 1	05206 0	C; 26751 0	12770 1	01546 1	I; 77776 1	33703 0	55777 0	
14,2330	33721 0	05206 0	C; 51245 0	37746 0	55400 0	06112 0	I; 73545 1	C; 02507 1	
14,2340	C; 02411 1	C; 16421 1	C; 02507 1	I; 77746 1	C; 02413 0	I; 77676 0	C; 02417 1	I; 77616 0	
14,2350	I; 77770 1	C; 00002 0	C; 00014 1	I; 77731 1	C; 00052 0	C; 00006 1	I; 60533 1	C; 02557 1	
14,2360	C; 00001 0	I; 77756 0	C; 10023 1	I; 77745 1	C; 00001 0	I; 41546 0	I; 47133 0	C; 02556 0	
14,2370	C; 33457 1	C; 00003 1	I; 41356 1	C; 00001 0	I; 77752 1	C; 10027 0	I; 77745 1	C; 00003 1	

OCTAL LISTING OF PARAGRAPH # 101, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
14,2400   I: 41346 0   I: 57552 1   C: 10025 1   I: 61170 0   C: 00000 1   C: 30356 1   I: 77616 0   I: 65345 0
14,2410   C: 33105 0   C: 02511 0   I: 57546 1   I: 73525 1   C: 02511 0   I: 74266 0   C: 31725 0   C: 02514 0
14,2420   I: 77634 0   C: 33454 1   C: 02565 0   I: 77616 0       05235 0       55547 1       04133 1   C: 00004 0
14,2430       12440 1       00004 0       37763 1       05663 1   C: 02003 0   C: 56063 1       32476 0       55547 1

14,2440       00006 1       30025 0       52145 0       00006 1       30145 1       53562 0       00003 1       37767 0
14,2450       54153 1       06112 0   I: 54225 0   C: 02565 0   C: 20212 1   I: 64361 1   C: 02514 0   C: 02401 0
14,2460   I: 77655 1   C: 02772 1   C: 16772 1   C: 02562 1   C: 02565 0   I: 47170 1   C: 02771 1   C: 33627 1
14,2470   I: 77776 1       05206 0   C: 26751 0       12770 1       51547 0       15230 1   C: 72651 0       00006 1

14,2500       23546 1       06112 0   I: 54340 1   C: 02537 1   C: 20204 0   I: 47005 1   C: 31723 0   C: 33520 0
14,2510   C: 06571 1   I: 77776 1       57551 1       51537 1       55572 1       41537 0       63707 1       00006 1
14,2520       63146 1       36311 1       27537 0       01546 1       00006 1       23546 1       37763 1       22007 0
14,2530       23550 0       54341 0       33675 0       04657 1       51550 0       53554 0       52340 1       02577 0

14,2540   C: 00661 0       12770 1       52340 1       51550 0       53554 0       11550 1       12552 0       37762 0
14,2550       54001 1       12530 1       01546 1   I: 62545 1   C: 02511 0   C: 14341 1   C: 02507 1   I: 77434 1
14,2560   C: 33522 1       56144 0       54337 1       02577 0   C: 00661 0       12770 1       06112 0   I: 47135 0
14,2570   C: 00340 0   C: 33457 1   C: 02507 1   I: 60535 1   C: 00341 1   C: 02511 0   I: 77616 0       00006 1

14,2600       23545 1       51545 1       30000 1       04444 1       12616 0       04622 0       04475 0       12612 1
14,2610       12614 1       12601 0       51545 1       00001 0       51545 1       00002 0       32620 1       04654 1
14,2620   C: 30601 0       00006 1       23546 1       51544 0       12625 0       12770 1       12633 1       12640 0
14,2630       12656 1       12677 1       12731 1       37763 1       55542 1       37762 0       55543 0       01546 1

14,2640       06112 0   I: 57575 1   C: 02401 0   I: 77715 1   C: 02415 0   C: 26401 0   I: 77626 0   C: 75362 1
14,2650   I: 77776 1       37767 0       55542 1       37763 1       55543 0       01546 1       06112 0   I: 63375 0
14,2660   C: 02401 0   C: 02407 0   I: 77715 1   C: 02415 0   C: 26401 0   I: 77626 0   C: 51362 1   I: 77626 0
14,2670   C: 75370 1   I: 77776 1       37767 0       55542 1       37762 0       55543 0       01546 1       37757 0

14,2700       60110 1       50110 1       54050 0       33701 1       04657 1       04475 0       12770 1       12703 0
14,2710       30400 0       50110 1       54024 0       30401 1       50110 1       54020 1       30402 1       50110 1
14,2720       54022 0       06112 0   I: 45034 1   C: 33031 0   C: 33043 0   I: 77634 0   C: 33031 0   I: 77776 1
14,2730       01546 1       31546 1       55551 0       02524 0       06112 0   I: 77624 1   C: 30350 1   I: 41575 0

14,2740   C: 00007 0   C: 02407 0   I: 76435 1   C: 00015 0   C: 02401 0   I: 76435 1   I: 77626 0   C: 75362 1
14,2750   I: 77776 1       01551 1       00006 1       23546 1       06112 0   I: 77775 1   C: 33105 0   C: 02772 1
14,2760   I: 77776 1       01546 1       37756 1       70326 1       00006 1       12767 1       12770 1       00002 0
14,2770       37754 0       67755 1       40000 0       00004 0       70074 0       54074 0       04417 1   C: 00000 1
```

OCTAL LISTING OF PARAGRAPH # 102. WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

14,3000	05206 0	C: 27046 0	05566 1	06112 0	I: 57575 1	C: 33101 1	C: 02437 0	C: 26461 0
14,3010	C: 33103 0	C: 02423 0	C: 26445 0	C: 33077 1	C: 02431 0	C: 02453 1	I: 77776 1	41544 1
14,3020	66311 1	00006 1	13024 0	13037 1	06112 0	I: 57575 1	C: 02423 0	I: 77715 1
14,3030	C: 02437 0	C: 02423 0	C: 26445 0	I: 77626 0	C: 75340 1	C: 02461 0	I: 77776 1	05206 0
14,3040	C: 26751 0	12770 1	02621 0	04724 1	02247 1	02762 0	05206 0	C: 26252 0
14,3050	05206 0	C: 26751 0	12770 1	30032 0	50110 1	54024 0	30033 1	50110 1
14,3060	54020 1	30034 0	50110 1	54022 0	37757 0	60110 1	50110 1	54050 0
14,3070	02263 1	06112 0	I: 77634 0	C: 33454 1	C: 02565 0	I: 77776 1	41512 1	67762 0
14,3100	00006 1	13103 1	12051 0	05206 0	C: 47236 0	33717 0	55546 0	05206 0
14,3110	C: 20250 1	05206 0	C: 22760 0	12547 1	05206 0	C: 26745 0	15567 1	06112 0
14,3120	I: 77170 1	C: 00000 1	C: 00006 1	I: 77624 1	C: 30353 1	I: 64375 1	C: 00015 0	C: 02401 0
14,3130	I: 77772 0	C: 34415 0	C: 20307 1	13140 0	05206 0	C: 26745 0	15567 1	15567 1
14,3140	04755 1	C: 00524 1	15567 1	47167 1	55512 1	12002 0	04644 0	37167 0
14,3150	55537 0	51537 1	41674 1	51537 1	27702 1	33705 0	61537 1	10000 0
14,3160	46311 0	27537 0	13151 0	55537 0	06112 0	I: 70750 1	C: 02537 1	C: 02701 0
14,3170	I: 77625 0	C: 02571 0	C: 06701 1	I: 77776 1	41537 0	63706 0	10000 0	36311 1
14,3200	27537 0	13164 0	55550 1	36311 1	55537 0	06112 0	I: 77775 1	C: 33105 0
14,3210	C: 00031 0	C: 00037 0	I: 77735 0	C: 31703 1	C: 00041 1	I: 77776 1	06112 0	I: 70750 1
14,3220	C: 02537 1	C: 02701 0	I: 41423 1	C: 02673 1	I: 42742 0	C: 02673 1	C: 06701 1	I: 43312 0
14,3230	C: 00031 0	C: 20031 1	C: 02701 0	I: 63512 0	I: 77615 0	C: 00033 1	C: 00033 1	I: 77776 1
14,3240	31550 0	61537 1	40000 0	63705 0	10000 0	36306 1	27537 0	13216 0
14,3250	61550 0	55537 0	06112 0	I: 66740 1	C: 02537 1	C: 02604 1	C: 00043 0	I: 77745 1
14,3260	I: 54206 1	C: 20211 1	I: 43265 1	C: 00043 0	C: 00035 1	C: 14035 1	I: 55261 1	C: 20207 0
14,3270	C: 00043 0	I: 42523 0	C: 02602 1	I: 77605 1	I: 77615 0	C: 00037 0	C: 00037 0	I: 77776 1
14,3300	41537 0	63704 1	61550 0	10000 0	36306 1	27537 0	13252 0	06112 0
14,3310	I: 41345 0	C: 00031 0	C: 00037 0	I: 41325 0	C: 00033 1	C: 00035 1	I: 77625 0	I: 63525 0
14,3320	C: 00031 0	I: 65342 1	C: 00041 1	I: 41261 1	C: 20212 1	C: 00033 1	I: 55225 1	I: 54205 1
14,3330	C: 31716 0	C: 20204 0	C: 00343 0	I: 77776 1	31544 0	54344 0	33677 1	04657 1
14,3340	04622 0	04475 0	12770 1	36311 1	55550 1	37767 0	13204 0	37743 0
14,3350	55576 0	37767 0	55577 1	55575 0	03356 1	25577 0	51577 0	33361 0
14,3360	15212 1	C: 31375 1	C: 31413 0	C: 31421 1	C: 31433 1	C: 31445 0	C: 31472 1	C: 31547 0
14,3370	C: 31574 0	C: 30770 1	C: 31477 1	C: 31552 1	C: 31577 0	37766 1	54337 1	34564 1

OCTAL LISTING OF PARAGRAPH # 103, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

14,3400	54340 1	00006 1	51575 1	01005 0	33666 1	04657 1	33673 0	04657 1
14,3410	04475 0	02770 0	03355 1	25575 1	24337 0	37767 0	00006 1	01005 0
14,3420	03377 1	34530 0	54337 1	35210 1	54340 1	00006 1	05011 1	37767 0
14,3430	00006 1	01006 0	03404 1	34570 1	54337 1	45210 0	00006 1	03011 1
14,3440	33671 1	54340 1	00006 1	05012 1	03404 1	43671 0	00006 1	03012 1
14,3450	37767 0	54337 1	54340 1	55575 0	37763 1	55576 0	00004 0	05663 1
14,3460	C; 03503 1	C; 30065 1	00003 1	33673 0	04657 1	04475 0	02770 0	37767 0
14,3470	55576 0	03355 1	37767 0	54055 0	33374 1	55574 1	05545 0	37743 0
14,3500	55575 0	37755 1	03456 0	11576 0	03511 1	31574 0	55576 0	05551 0
14,3510	05727 0	11575 0	03525 0	34563 0	54055 0	37760 1	00006 1	05014 1
14,3520	37756 1	05663 1	C; 03503 1	C; 30065 1	05727 0	44563 1	03514 1	11576 0
14,3530	03535 1	31574 0	55576 0	05551 0	05727 0	33667 0	54060 0	37761 0
14,3540	00006 1	05014 1	37756 1	05663 1	C; 03527 1	C; 30065 1	05727 0	33373 0
14,3550	55574 1	05545 0	37767 0	55575 0	47760 0	00006 1	03014 1	00004 0
14,3560	37763 1	05663 1	C; 03527 1	C; 30065 1	00003 1	33673 0	04657 1	04475 0
14,3570	02770 0	37767 0	55576 0	03355 1	33374 1	55574 1	05545 0	37763 1
14,3600	55575 0	37762 0	00006 1	05014 1	03557 0	06112 0	I; 77414 0	C; 00065 1
14,3610	02135 1	06112 0	I; 47375 0	C; 02601 1	C; 02607 1	I; 77646 0	C; 24023 0	C; 02601 1
14,3620	I; 77641 1	C; 02607 1	C; 34021 0	C; 32476 0	I; 77634 0	C; 33522 1	C; 00025 0	I; 77776 1
14,3630	33720 1	60110 1	54146 0	33676 0	04657 1	12770 1	00004 0	37767 0
14,3640	54026 1	33665 1	54003 0	22007 0	50000 1	23401 0	67762 0	26003 0
14,3650	74564 0	10000 0	13643 1	10003 0	13657 1	05225 1	C; 02000 0	00003 1
14,3660	37767 0	54347 0	00004 0	47763 0	13643 1	C; 00027 1	C; 00430 0	C; 52525 1
14,3670	C; 70707 0	C; 37400 1	C; 00130 0	C; 03300 1	C; 00130 0	C; 00530 1	C; 00603 1	C; 00666 1
14,3700	C; 02430 1	C; 02522 0	C; 00013 0	C; 00021 1	C; 00074 1	C; 00077 1	C; 00105 0	C; 00110 1
14,3710	C; 05670 0	C; 13560 0	C; 01500 0	C; 01570 1	C; 02570 1	C; 00322 1	C; 14366 1	C; 03114 0
14,3720	C; 00024 1	C; 01400 1	C; 24365 1	C; 30244 0	C; 07623 1	C; 26552 1	05206 0	C; 26751 0
14,3730	12770 1	02752 0	06112 0	I; 77624 1	C; 30407 1	I; 77776 1	31617 0	65336 1
14,3740	55616 0	00006 1	13745 0	37762 0	03746 1	37763 1	55672 1	05206 0
14,3750	C; 50551 0	C; 37777 1	C; 03752 1	C; 03753 0	CKSM 67276 0	@	@	@
14,3760	@	@	@	@	@	@	@	@
14,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 104, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

15,2000	C; 00437 1	54016 1	00006 1	22012 1	51401 0	10000 0	02032 1	37755 1
15,2010	00006 1	05013 0	32235 1	27400 0	02046 1	32233 1	02116 0	02152 0
15,2020	02206 1	02226 0	42112 0	27400 0	02046 1	32234 0	02116 0	02152 0
15,2030	02206 1	12006 1	30411 0	55400 0	47755 0	00006 1	03013 0	00006 1
15,2040	23401 0	32000 0	54001 1	31400 1	75337 1	12140 1	00006 1	23406 1
15,2050	37767 0	54061 1	32114 1	54062 1	61400 1	00006 1	50000 1	50000 1
15,2060	30001 0	50061 0	53410 1	37762 0	26061 1	10062 1	12053 1	32113 0
15,2070	55402 1	32115 0	55401 1	00006 1	51400 1	50013 0	30001 0	12140 1
15,2100	11402 1	12103 0	01406 1	55402 1	60000 1	40000 0	00006 1	50000 1
15,2110	31434 0	12140 1	C; 00014 1	C; 00013 0	C; 00012 1	C; 02100 1	00006 1	23406 1
15,2120	55402 1	67763 1	40000 0	27400 0	32151 0	55401 1	31402 0	55402 1
15,2130	61400 1	50000 1	30000 1	54003 0	74564 0	00006 1	50000 1	31401 0
15,2140	00006 1	01034 1	30001 0	00006 1	01035 0	15733 1	11402 1	12127 0
15,2150	01406 1	C; 02146 0	00006 1	23406 1	32175 0	55401 1	36311 1	55402 1
15,2160	00006 1	50000 1	52202 0	00000 1	54001 1	00006 1	51402 0	52176 0
15,2170	00000 1	12140 1	11402 1	12157 1	01406 1	C; 02172 1	C; 00032 0	C; 00030 1
15,2200	C; 00013 0	C; 00011 1	C; 00033 1	C; 00031 0	C; 00014 1	C; 00012 1	00006 1	23406 1
15,2210	32225 0	55401 1	37766 1	55402 1	60000 1	40000 0	00006 1	50000 1
15,2220	30326 0	12140 1	11402 1	12213 1	01406 1	C; 02222 1	00006 1	23401 0
15,2230	00006 1	30025 0	12140 1	C; 00032 0	C; 00032 0	C; 00102 1	C; 00076 0	C; 00074 1
15,2240	C; 03017 1	C; 03015 0	C; 00033 1	C; 00031 0	C; 02343 1	C; 02341 0	C; 02337 1	C; 02327 0
15,2250	C; 02325 1	C; 02323 1	C; 02335 0	C; 02333 0	C; 02331 1	C; 02345 1	C; 00764 1	C; 01166 1
15,2260	C; 01164 0	C; 01172 1	C; 01170 0	C; 02551 1	C; 01143 0	C; 01141 1	C; 01137 0	C; 01135 1
15,2270	C; 01133 1	C; 00033 1	C; 00033 1	C; 01320 1	C; 00100 0	C; 00041 1	C; 00037 0	C; 01364 1
15,2300	C; 01362 1	C; 01360 0	C; 01567 1	C; 01565 0	C; 01563 0	C; 00076 0	C; 00074 1	C; 03017 1
15,2310	C; 03015 0	C; 00033 1	C; 00031 0	C; 01556 0	C; 02267 0	C; 03260 0	C; 02570 1	C; 01311 0
15,2320	C; 00365 1	C; 02313 1	C; 02311 0	C; 02307 1	C; 02305 0	C; 02303 0	C; 02301 1	C; 02277 1
15,2330	C; 02315 1	C; 02321 0	C; 03021 1	C; 01143 0	C; 01141 1	C; 01137 0	C; 01135 1	C; 01133 1
15,2340	C; 00407 1	C; 00405 0	C; 00403 0	C; 00767 1	C; 00765 0	C; 01326 1	C; 01022 0	C; 01020 1
15,2350	C; 01016 1	C; 01014 0	C; 01012 0	C; 01010 1	35337 0	02033 0	37755 1	00006 1
15,2360	05013 0	32424 1	55401 1	31404 0	13707 0	37763 1	54061 1	50000 1
15,2370	30767 1	00006 1	50061 0	20033 0	00006 1	62377 0	40000 0	61405 1

OCTAL LISTING OF PARAGRAPH # 105, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

15,2400	00006 1	62413 0	10061 1	12366 1	11403 0	12407 1	12413 1	55403 0
15,2410	00006 1	30034 0	12140 1	31346 1	55310 0	40077 0	77751 1	26077 0
15,2420	32423 0	55401 1	12410 1	C; 02006 0	C; 02365 0	I; 71220 1	C; 00051 0	C; 02423 0
15,2430	I; 65365 0	C; 33105 0	C; 02427 1	I; 55476 1	I; 77656 1	C; 14027 1	C; 00027 1	I; 77742 0
15,2440	C; 14023 0	C; 00033 1	I; 77742 0	C; 34021 0	C; 32476 0	C; 16503 0	C; 02425 0	I; 77742 0
15,2450	C; 14023 0	C; 00027 1	I; 65205 0	C; 02427 1	C; 00033 1	I; 45205 1	C; 02423 0	I; 77626 0
15,2460	C; 43756 1	C; 32476 0	C; 26505 0	C; 00027 1	I; 77641 1	C; 02437 0	C; 24021 1	C; 00027 1
15,2470	I; 77641 1	C; 02431 0	C; 34023 1	C; 32476 0	C; 36501 0	C; 00051 0	I; 51545 1	C; 00023 0
15,2500	I; 50025 0	C; 33073 0	C; 32511 0	I; 72545 0	C; 00021 1	I; 75326 1	C; 00023 0	C; 00025 0
15,2510	I; 77616 0	I; 72545 0	C; 00023 0	I; 77736 0	C; 14025 0	C; 00021 1	I; 77640 0	C; 32522 0
15,2520	I; 43545 1	C; 00025 0	I; 75345 1	C; 33075 0	C; 00023 0	I; 77625 0	C; 00025 0	C; 00025 0
15,2530	I; 77616 0	I; 43020 1	C; 00051 0	C; 00264 1	I; 77170 1	C; 00004 0	C; 00000 1	I; 77624 1
15,2540	C; 32601 1	I; 77170 1	C; 00002 0	C; 00004 0	I; 77624 1	C; 32601 1	I; 77170 1	C; 00000 1
15,2550	C; 00002 0	I; 77624 1	C; 32601 1	I; 77650 1	C; 00051 0	I; 43020 1	C; 00051 0	C; 00064 0
15,2560	I; 77170 1	C; 00000 1	C; 00002 0	I; 77624 1	C; 32601 1	I; 77170 1	C; 00002 0	C; 00004 0
15,2570	I; 77624 1	C; 32601 1	I; 77170 1	C; 00004 0	C; 00000 1	I; 77624 1	C; 32601 1	I; 77650 1
15,2600	C; 00051 0	I; 66660 1	C; 00050 1	C; 00005 1	I; 56034 0	C; 33457 1	C; 00050 1	C; 00037 0
15,2610	I; 77746 1	C; 04011 0	I; 73545 1	C; 00037 0	C; 04013 1	I; 72403 0	C; 77732 1	I; 40723 0
15,2620	C; 00011 1	C; 77732 1	I; 64752 0	C; 00013 0	I; 72403 0	C; 00045 0	I; 77614 1	C; 00344 1
15,2630	C; 32643 1	I; 45421 1	C; 67732 0	I; 77743 1	C; 00011 1	I; 72403 0	C; 00045 0	I; 45415 0
15,2640	C; 73732 0	I; 43575 1	C; 00041 1	I; 45415 0	C; 67732 0	I; 77743 1	C; 00011 1	I; 72403 0
15,2650	C; 00045 0	I; 45425 0	C; 73732 0	I; 43575 1	C; 00041 1	I; 47375 0	C; 02423 0	C; 02407 0
15,2660	I; 41456 0	I; 44041 1	C; 02437 0	C; 00051 0	C; 24021 1	C; 00001 0	I; 77641 1	C; 02431 0
15,2670	C; 34023 1	C; 32476 0	C; 26501 1	C; 00001 0	I; 50235 0	C; 02423 0	C; 02407 0	I; 77752 1
15,2700	C; 24021 1	C; 02407 0	I; 77641 1	C; 02423 0	C; 34023 1	C; 32476 0	C; 02505 0	I; 45246 0
15,2710	C; 33113 1	I; 77644 1	C; 32731 0	I; 50375 0	C; 02415 0	C; 00001 0	C; 24021 1	C; 02401 0
15,2720	I; 45441 1	C; 43754 0	C; 32476 0	C; 26503 0	C; 02501 1	I; 77634 0	C; 33526 0	C; 34401 0
15,2730	C; 00051 0	I; 77776 1	06051 0	C; 00200 0	04755 1	C; 00401 1	06112 0	I; 77650 1
15,2740	C; 32713 0	I; 66370 0	C; 02452 0	C; 00051 0	C; 02436 1	I; 46773 0	C; 02461 0	C; 02467 0
15,2750	I; 77656 1	C; 06467 1	I; 77773 1	C; 02461 0	I; 76433 1	C; 02467 0	C; 06475 1	I; 77700 0
15,2760	C; 32745 0	I; 66160 0	C; 00006 1	C; 00036 1	I; 66370 0	C; 00022 1	C; 00051 0	C; 00006 1
15,2770	I; 66374 1	C; 00006 1	C; 00052 0	C; 00002 0	I; 76720 0	C; 00036 1	C; 00001 0	I; 62757 0

OCTAL LISTING OF PARAGRAPH # 106, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

15,3000	C; 75324 0	C; 00007 0	I; 77757 1	C; 75316 1	C; 30031 0	C; 00015 0	I; 53357 0	C; 75310 1
15,3010	I; 76455 1	C; 00031 0	I; 77720 1	C; 00036 1	C; 06445 1	I; 77700 0	C; 33017 1	I; 77704 1
15,3020	C; 32774 1	I; 77775 1	C; 02423 0	C; 26445 0	C; 02431 0	C; 26453 1	C; 02437 0	C; 02461 0
15,3030	I; 77616 0	53447 0	53453 0	53447 0	53451 1	53461 1	53451 1	53457 1
15,3040	53463 0	53457 1	16125 0	I; 77220 1	C; 00014 1	C; 33103 0	C; 34041 0	C; 32531 1
15,3050	I; 76521 0	C; 02445 0	C; 26401 0	C; 33101 1	C; 34041 0	C; 32531 1	I; 76521 0	C; 02445 0
15,3060	C; 26407 0	C; 33077 1	C; 34041 0	C; 32531 1	I; 76521 0	C; 02445 0	C; 36415 1	C; 00014 1
15,3070	C; 61777 1	C; 77777 0	C; 05520 0	C; 26075 1	C; 20000 0	C; 00000 1	C; 00000 1	C; 00000 1
15,3100	C; 00000 1	C; 00000 1	C; 20000 0	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1
15,3110	C; 00000 1	C; 00000 1	C; 05252 1	C; 25253 1	I; 66601 0	C; 00001 0	C; 00013 0	I; 41542 1
15,3120	I; 47133 0	C; 00004 0	C; 33457 1	C; 00017 1	I; 41415 1	I; 65346 0	I; 41556 1	I; 47133 0
15,3130	C; 00006 1	C; 33457 1	C; 00021 1	I; 52054 1	C; 33136 0	C; 33146 1	I; 53145 1	C; 00017 1
15,3140	C; 33143 1	I; 77650 1	C; 33146 1	I; 52145 0	C; 33105 0	C; 33153 0	I; 45345 1	C; 00017 1
15,3150	C; 00021 1	I; 77621 1	C; 33240 1	I; 41405 0	C; 33236 0	I; 65346 0	I; 41556 1	I; 72405 0
15,3160	C; 00001 0	C; 14001 0	C; 00003 1	I; 45405 1	C; 77774 0	I; 47133 0	C; 00012 1	C; 33457 1
15,3170	I; 73406 1	I; 71525 0	I; 41206 0	C; 00001 0	I; 41325 0	C; 00005 1	C; 00007 0	I; 72415 1
15,3200	I; 77626 0	C; 63736 0	I; 77605 1	C; 00005 1	C; 14005 1	I; 44205 0	C; 00001 0	I; 66606 1
15,3210	C; 00011 1	I; 41434 1	C; 33457 1	I; 65346 0	I; 77756 0	C; 00001 0	I; 65205 0	C; 00005 1
15,3220	C; 00007 0	I; 43205 1	C; 00003 1	I; 77712 0	C; 14043 0	I; 45405 1	C; 63732 1	I; 77605 1
15,3230	I; 62421 1	C; 00045 0	C; 24045 0	C; 00041 1	I; 77616 0	C; 02525 1	C; 12525 0	C; 37777 1
15,3240	C; 37777 1	I; 40220 0	C; 00035 1	C; 00001 0	I; 66740 1	C; 00050 1	C; 00011 1	I; 77742 0
15,3250	I; 71406 0	I; 73525 1	I; 66606 1	C; 00007 0	I; 41434 1	C; 33457 1	I; 65346 0	I; 41556 1
15,3260	I; 65205 0	C; 00001 0	I; 65205 0	C; 00003 1	C; 00005 1	I; 65205 0	C; 00001 0	C; 00005 1
15,3270	I; 41405 0	I; 47133 0	C; 00010 0	C; 33457 1	I; 73406 1	I; 71525 0	I; 41206 0	C; 00001 0
15,3300	I; 77752 1	C; 14041 1	I; 72405 0	C; 00003 1	I; 65276 1	C; 00017 1	I; 72405 0	C; 00007 0
15,3310	I; 72421 0	C; 00015 0	C; 14043 0	C; 00017 1	I; 72405 0	C; 00013 0	I; 72415 1	C; 00011 1
15,3320	I; 77676 0	C; 14045 0	C; 00017 1	I; 72405 0	C; 00011 1	I; 72415 1	C; 00013 0	I; 41325 0
15,3330	C; 00017 1	C; 00015 0	I; 72425 1	C; 00007 0	C; 34025 1	C; 32555 0	C; 24013 0	C; 00021 1
15,3340	I; 62120 0	C; 00050 1	C; 00001 0	I; 77720 1	C; 00050 1	C; 34041 0	C; 32555 0	I; 76435 1
15,3350	C; 00013 0	I; 53476 1	C; 00041 1	I; 77650 1	C; 00035 1	I; 57545 1	C; 00043 0	I; 67401 0
15,3360	C; 00001 0	I; 44206 0	C; 33075 0	C; 14005 1	C; 33105 0	C; 24043 0	C; 00041 1	I; 41056 1
15,3370	C; 20347 0	C; 14041 1	C; 00041 1	I; 44142 0	C; 00051 0	C; 14023 0	C; 00045 0	I; 77742 0

OCTAL LISTING OF PARAGRAPH # 107, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

15,3400	C: 34021 0	C: 32476 0	I: 43206 1	C: 33075 0	C: 24007 0	C: 00005 1	I: 77634 0	C: 33543 0
15,3410	C: 24425 1	C: 00001 0	I: 77634 0	C: 33543 0	C: 00423 1	I: 77776 1	40412 1	77750 0
15,3420	10000 0	13425 0	52423 0	52425 0	52423 0	06112 0	I: 77650 1	C: 00051 0
15,3430	I: 47135 0	C: 00423 1	C: 33457 1	I: 41401 1	C: 00001 0	I: 57556 0	C: 14043 0	I: 41546 0
15,3440	I: 47135 0	C: 00424 0	C: 33457 1	I: 71406 0	I: 72405 0	C: 00001 0	C: 14045 0	I: 41356 1
15,3450	I: 77752 1	C: 24041 1	C: 00041 1	I: 77616 0	00006 1	30025 0	16542 0	10144 1
15,3460	37767 0	13464 0	13463 1	47746 1	54145 0	37767 0	56144 0	00006 1
15,3470	77746 1	20145 0	16544 0	00004 0	30033 1	54144 1	30034 0	54147 1
15,3500	30032 0	13510 1	00004 0	30037 0	54144 1	30040 0	54147 1	30041 1
15,3510	00003 1	54151 0	37767 0	54145 0	54150 1	54152 0	47763 0	16124 1
15,3520	07327 0	16125 0	03552 0	37767 0	54145 0	16124 1	03552 0	52152 0
15,3530	52145 0	03552 0	54146 0	52150 1	52145 0	03552 0	54145 0	30151 1
15,3540	54144 1	37763 1	16124 1	03552 0	52150 1	52145 0	03552 0	54001 1
15,3550	30147 0	16542 0	52145 0	20001 1	10000 0	67763 1	13560 0	40000 0
15,3560	54144 1	00002 0	50000 1	37744 1	26144 1	00002 0	33601 0	54120 0
15,3570	30144 0	03602 0	24120 1	30147 0	03602 0	24120 1	30151 1	03602 0
15,3600	13516 1	C: 00400 0	54132 0	50120 1	10000 0	67763 1	13612 0	67763 1
15,3610	67763 1	40000 0	60132 1	10000 0	67763 1	13617 0	40000 0	54132 0
15,3620	13624 0	50000 1	37744 1	60132 1	50120 1	54000 0	00002 0	50110 1
15,3630	30046 0	05206 0	C: 26362 1	16125 0	05701 1	C: 00062 0	37762 0	00006 1
15,3640	02012 0	00006 1	13634 1	30132 1	54070 1	33705 0	56120 1	54071 0
15,3650	30361 0	60000 1	00006 1	73706 1	03602 0	24120 1	30035 1	00006 1
15,3660	20007 1	05354 0	00006 1	77746 1	10000 0	13670 1	13670 1	13670 1
15,3670	67763 1	54061 1	30362 0	00006 1	73706 1	00006 1	10061 1	03602 0
15,3700	30070 0	54132 0	30071 1	54120 0	13634 1	C: 00035 1	C: 22755 0	55403 0
15,3710	35632 0	56003 1	54001 1	43723 0	00006 1	03012 1	37745 0	55754 1
15,3720	55753 0	22003 1	12365 1	C: 07400 1	C: 37777 1	C: 03725 1	C: 03726 1	CKSM 74421 0
15,3730	@	@	@	@	@	@	@	@
15,3740	@	@	@	@	@	@	@	@
15,3750	@	@	@	@	@	@	@	@
15,3760	@	@	@	@	@	@	@	@
15,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 110, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

16,2000	22016 0	00006 1	22012 1	06013 0	15733 1	37756 1	70365 0	10000 0
16,2010	12166 0	37760 1	67757 0	00006 1	02012 0	10000 0	12166 0	37752 0
16,2020	00006 1	02030 0	10000 0	12166 0	00006 1	00031 0	40000 0	75210 0
16,2030	00006 1	12166 0	37751 0	70077 0	00006 1	12166 0	00002 0	22016 0
16,2040	13627 0	04736 1	37761 0	70077 0	00006 1	12207 1	02005 0	05270 1
16,2050	C; 40114 1	37767 0	54031 1	55611 1	55612 1	55605 1	55606 1	55463 0
16,2060	55464 1	55465 0	55466 0	55467 1	55470 1	55415 1	55416 1	55420 1
16,2070	55002 0	55003 1	55473 1	55474 0	55007 0	55417 0	55421 0	55515 0
16,2100	55642 1	12455 0	37762 0	00006 1	02030 0	00006 1	12117 0	37767 0
16,2110	55655 1	00006 1	32251 0	53477 0	00006 1	32245 0	12126 1	32254 0
16,2120	55655 1	00006 1	32253 1	53477 0	00006 1	32247 1	53501 0	00006 1
16,2130	30033 1	53426 1	00006 1	30034 0	53430 0	32230 1	55455 0	32231 0
16,2140	55456 0	00006 1	32241 1	53653 1	00006 1	32243 0	53641 1	32236 1
16,2150	05663 1	C; 03435 0	C; 40066 0	00006 1	32225 0	53573 0	00006 1	32223 0
16,2160	53001 0	32226 0	54030 0	15733 1	C; 02037 1	C; 34066 0	42222 0	61000 0
16,2170	00006 1	12176 1	00006 1	32165 1	53001 0	12161 1	37767 0	00006 1
16,2200	01005 0	00006 1	01006 0	42220 1	00006 1	03012 1	12172 0	37750 1
16,2210	70077 0	00006 1	12166 0	55655 1	05505 1	C; 02713 0	C; 54066 0	12172 0
16,2220	C; 07400 1	C; 26501 1	C; 02255 1	C; 34066 0	C; 03642 1	C; 34066 0	C; 37766 1	C; 00033 1
16,2230	C; 23712 1	C; 25705 1	C; 12000 1	C; 02215 0	C; 11643 0	C; 00033 1	C; 00022 1	C; 02315 1
16,2240	C; 02404 0	C; 02106 1	C; 24000 1	C; 15253 1	C; 77001 0	C; 77555 1	C; 76447 1	C; 77223 1
16,2250	C; 77717 0	C; 74777 0	C; 77767 1	C; 77377 1	C; 76615 1	33754 1	54030 0	22016 0
16,2260	00006 1	22012 1	02005 0	00006 1	31573 1	12406 0	37762 0	54066 0
16,2270	50066 1	30766 0	00006 1	50066 1	20771 1	10000 0	67763 1	12301 0
16,2300	40000 0	50066 1	54766 1	10066 0	12267 1	37767 0	54061 1	31611 0
16,2310	63566 1	00006 1	62316 1	54061 1	33603 1	12324 1	31611 0	00006 1
16,2320	77757 1	30001 0	00006 1	75771 0	55611 1	00006 1	71640 0	61643 1
16,2330	00006 1	71611 1	00006 1	77760 0	31613 1	00006 1	70001 1	00006 1
16,2340	71657 0	23604 1	30061 0	55611 1	30032 0	54001 1	00006 1	21425 1
16,2350	23425 0	22007 0	52063 0	37753 1	54002 1	30033 1	54001 1	00006 1
16,2360	21426 1	23426 0	00006 1	71404 1	20063 0	00006 1	30063 1	00006 1
16,2370	10002 1	00006 1	71640 0	57415 0	00006 1	71642 1	61604 1	27415 1

OCTAL LISTING OF PARAGRAPH # 111, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

16,2400	01652 1	32240 0	55652 0	15733 1	06013 0	12777 0	53001 0	11764 1
16,2410	55764 1	11753 0	12427 0	12433 0	11754 1	12431 1	12443 1	11744 0
16,2420	12424 0	04736 1	12566 1	12566 1	37771 1	27744 0	12566 1	55753 0
16,2430	12414 0	55754 1	12417 0	55523 0	55533 1	42453 0	00006 1	03012 1
16,2440	37745 0	55753 0	12414 0	55525 0	55535 1	42454 1	00006 1	03012 1
16,2450	37745 0	55754 1	12417 0	C; 01400 1	C; 06000 1	55643 0	30075 0	77757 1
16,2460	00006 1	12102 1	37747 1	00006 1	05011 1	41753 0	00006 1	62472 1
16,2470	37767 0	55523 0	41754 1	00006 1	62477 1	37767 0	55525 0	05270 1
16,2500	C; 43243 0	12102 1	37756 1	00077 0	00006 1	12521 1	40764 0	67765 1
16,2510	00006 1	12513 0	12516 0	32523 1	00006 1	01005 0	33567 0	54030 0
16,2520	15733 1	37767 0	12514 1	C; 00252 1	00006 1	02011 0	10000 0	12544 1
16,2530	11355 1	12544 1	12535 1	12544 1	12544 1	37752 0	05505 1	C; 02551 1
16,2540	C; 34060 0	37751 0	00006 1	05011 1	37751 0	70077 0	00006 1	12502 0
16,2550	12042 1	10067 1	05532 0	30377 1	00006 1	62562 1	11355 1	12562 0
16,2560	12551 0	12562 0	47751 1	00006 1	03011 1	15567 1	30377 1	00006 1
16,2570	62266 1	37751 0	00006 1	02011 0	10000 0	12266 0	11355 1	12266 0
16,2600	12603 1	12266 0	12266 0	37752 0	05505 1	C; 02551 1	C; 34060 0	37751 0
16,2610	00006 1	05011 1	12266 0	00006 1	77761 1	30001 0	00006 1	73576 1
16,2620	55611 1	55475 1	31462 0	61500 0	00006 1	62631 1	37743 0	55461 1
16,2630	12642 1	37745 0	55461 1	31611 0	60000 1	55611 1	55475 1	63577 1
16,2640	00006 1	62772 1	00006 1	00006 1	10000 0	12653 1	37757 0	22077 1
16,2650	00006 1	06001 0	54077 0	33565 1	47475 1	37767 0	54065 0	11434 1
16,2660	37765 1	26065 0	11461 1	36306 1	12705 0	37766 1	54066 0	26065 0
16,2670	40077 0	77757 1	10000 0	12710 1	00006 1	26065 0	50065 1	32754 0
16,2700	70103 1	00006 1	12724 0	24065 1	12710 1	26065 0	36306 1	54066 0
16,2710	50065 1	32754 0	70103 1	00006 1	12724 0	00006 1	26065 0	10066 0
16,2720	12707 1	00006 1	32753 1	52006 0	50065 1	32754 0	00006 1	06006 1
16,2730	00006 1	12747 0	50065 1	32754 0	06043 0	10000 0	37762 0	12741 0
16,2740	37761 0	00006 1	71434 1	23657 1	37753 1	55472 0	13374 0	33564 0
16,2750	27475 1	12732 1	C; 02374 0	C; 40066 0	C; 00202 1	C; 00210 1	C; 00050 1	C; 00042 1
16,2760	C; 00240 1	C; 00012 1	C; 40252 0	C; 00101 1	C; 00021 1	C; 00024 1	C; 00104 1	C; 00005 1
16,2770	C; 00120 1	C; 40125 0	37767 0	55611 1	55475 1	06043 0	15733 1	30033 1

OCTAL LISTING OF PARAGRAPH # 112, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

16,3000	00006 1	20767 0	00006 1	71404 1	57411 1	30032 0	00006 1	20766 1
16,3010	27411 0	55466 0	40774 1	61415 0	55422 0	30077 1	00006 1	63074 1
16,3020	37743 0	00006 1	71411 0	61422 1	00006 1	63061 0	33072 1	54063 0
16,3030	31422 1	00006 1	73073 1	10000 0	13067 1	13037 1	13067 1	22000 1
16,3040	00006 1	70000 0	61411 1	63072 1	00006 1	62772 1	33071 1	55611 1
16,3050	55475 1	37745 0	55461 1	10063 0	37763 1	13057 1	47763 0	55434 1
16,3060	12642 1	41411 0	57411 1	41422 0	57422 1	43072 0	13027 0	37747 1
16,3070	13042 0	C; 00120 1	C; 77644 1	C; 00007 0	37746 0	55716 1	11422 0	13111 1
16,3100	13121 1	13103 1	13121 1	55407 1	47746 1	55716 1	41466 0	55411 0
16,3110	31407 0	67763 1	00006 1	77761 1	00006 1	13120 0	37743 0	13121 1
16,3120	30001 0	55407 1	00006 1	71407 1	55412 0	37771 1	55434 1	37745 0
16,3130	55461 1	31412 1	00006 1	71440 1	00006 1	77746 1	61411 1	00006 1
16,3140	60375 0	55444 0	00006 1	63202 1	63555 1	00006 1	63153 0	41407 1
16,3150	63757 1	00006 1	63177 0	31407 0	00006 1	71440 1	55510 0	43563 0
16,3160	61510 1	00006 1	63165 0	37746 0	13356 0	41444 0	61632 1	00006 1
16,3170	63232 1	31510 1	63554 0	00006 1	63342 1	63556 1	13316 1	37743 0
16,3200	55461 1	13163 1	31412 1	00006 1	72234 1	61411 1	60375 0	61632 1
16,3210	00006 1	63213 1	12772 0	43552 1	61407 0	00006 1	63220 1	12772 0
16,3220	37763 1	55434 1	41407 1	00006 1	71440 1	55510 0	41444 0	61411 1
16,3230	61411 1	61632 1	55444 0	31440 0	00006 1	77746 1	62234 0	55446 1
16,3240	00006 1	73553 0	61444 1	00006 1	63322 1	31440 0	00006 1	71440 1
16,3250	52073 1	31444 1	22007 0	00006 1	11446 1	54071 0	00006 1	70073 1
16,3260	54073 1	37767 0	56072 1	00006 1	70071 0	20073 1	00006 1	30073 0
16,3270	52064 1	43563 0	61510 1	00006 1	70000 0	20073 1	30072 1	00006 1
16,3300	13302 1	13303 0	30073 0	00006 1	63163 0	43560 0	61510 1	00006 1
16,3310	63326 0	00006 1	40064 1	05270 1	C; 54525 1	61510 1	60000 1	00006 1
16,3320	73576 1	13356 0	33551 0	00006 1	71440 1	13315 1	00006 1	30064 0
16,3330	52073 1	43560 0	61510 1	00006 1	70000 0	20073 1	30072 1	00006 1
16,3340	13370 1	13371 0	31407 0	00006 1	12772 0	31716 0	00006 1	63352 0
16,3350	43561 1	13353 0	33561 0	60774 0	55415 1	33560 1	55611 1	31716 0
16,3360	00006 1	63363 1	13365 0	41434 1	55434 1	31611 0	55475 1	12642 1
16,3370	30073 0	00006 1	63311 1	12772 0	41475 1	63562 0	00006 1	65733 0

OCTAL LISTING OF PARAGRAPH # 113, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

16,3400	33604 0	55652 0	10031 1	13426 0	13410 0	13426 0	06017 1	13402 0
16,3410	31475 0	54031 1	37745 0	00006 1	05013 0	31472 1	55004 0	37767 0
16,3420	57474 1	55002 0	37767 0	57473 0	55005 1	15733 1	11002 0	13507 1
16,3430	41475 1	60031 0	10000 0	67763 1	13451 0	13436 1	67763 1	55002 0
16,3440	31472 1	55005 1	37767 0	57474 1	55003 1	37767 0	57473 0	55006 1
16,3450	15733 1	55002 0	31475 0	54031 1	31472 1	57004 1	55005 1	41474 0
16,3460	00006 1	15733 1	61002 1	10000 0	67763 1	13476 0	13467 0	67763 1
16,3470	55003 1	37767 0	55474 0	57473 0	55006 1	15733 1	55003 1	37767 0
16,3500	57474 1	55002 0	37767 0	57473 0	57005 0	55006 1	15733 1	41475 1
16,3510	60031 0	61002 1	10000 0	67763 1	13523 1	13516 1	67763 1	55003 1
16,3520	31472 1	55006 1	15733 1	54001 1	41475 1	60031 0	10000 0	67763 1
16,3530	13540 1	13532 1	67763 1	55002 0	30001 0	55003 1	31472 1	13546 1
16,3540	57002 1	55003 1	31475 0	54031 1	31472 1	57004 1	57005 0	57006 0
16,3550	15733 1	C; 36115 1	C; 34344 0	C; 31221 1	C; 77733 0	C; 77071 1	C; 00050 1	C; 00010 0
16,3560	C; 00014 1	C; 00044 1	C; 00360 1	C; 00232 1	C; 77753 0	C; 00013 0	C; 77537 0	C; 37775 0
16,3570	C; 34362 1	C; 24366 1	C; 77555 1	C; 77001 0	C; 76447 1	C; 77223 1	C; 31000 0	C; 77764 1
16,3600	C; 00077 1	C; 00600 1	C; 71462 1	C; 03146 1	C; 02401 0	C; 37533 0	22016 0	00006 1
16,3610	22012 1	33640 0	55000 1	33636 1	54030 0	05270 1	C; 40114 1	05270 1
16,3620	C; 40127 1	33637 0	54375 1	37774 1	55732 1	15733 1	22016 0	00006 1
16,3630	22012 1	30377 1	00006 1	62544 0	37751 0	12524 1	C; 37634 1	C; 00707 1
16,3640	C; 03626 0	C; 34066 0	33567 0	54030 0	22016 0	00006 1	33756 0	53001 0
16,3650	37762 0	00006 1	02030 0	00006 1	13716 0	40075 1	77757 1	13660 0
16,3660	00006 1	13666 0	37767 0	55664 0	55665 1	15735 1	37763 1	54061 1
16,3670	60000 1	54062 1	50061 0	33751 1	00006 1	02012 0	00006 1	13713 0
16,3700	41642 1	00006 1	77753 0	63760 0	00006 1	73753 1	00006 1	50062 0
16,3710	71533 1	50061 0	27664 0	10061 1	13667 1	15735 1	11732 1	13737 0
16,3720	13741 1	15735 1	55624 1	55625 0	55622 1	55623 0	55650 1	41416 1
16,3730	55626 0	41420 1	55627 1	40077 0	77754 1	26077 0	33750 0	55732 1
16,3740	15735 1	33750 0	55732 1	00006 1	33747 0	52005 0	C; 41245 1	C; 03245 1
16,3750	C; 00023 0	C; 01400 1	C; 06000 1	C; 00243 1	C; 37776 0	C; 02002 1	C; 36066 1	C; 01330 0
16,3760	C; 77377 1	C; 37777 1	C; 03762 1	C; 03763 0	CKSM 43501 1	@	@	@
16,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 114, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

17,2000	C; 03033 1	C; 40066 0	32560 0	54030 0	22016 0	00006 1	22012 1	00006 1
17,2010	32001 1	12107 1	30033 1	54001 1	00006 1	21427 0	23427 1	54061 1
17,2020	30034 0	54001 1	00006 1	21430 0	23430 1	54062 1	31406 1	00006 1
17,2030	70061 1	52065 0	31403 1	00006 1	70062 1	20065 0	37753 1	54002 1
17,2040	00006 1	30065 1	00006 1	10002 1	54064 1	31405 1	00006 1	70061 1
17,2050	52063 0	00006 1	71401 1	20063 0	00006 1	30063 1	00006 1	10002 1
17,2060	00006 1	71641 1	57416 0	00006 1	71642 1	61605 0	61664 1	27416 1
17,2070	30064 0	00006 1	71641 1	57420 0	00006 1	71642 1	61606 0	61665 0
17,2100	27420 1	01653 0	32105 1	55653 1	12610 0	C; 02106 1	12620 0	53001 0
17,2110	11744 0	12121 0	04736 1	12012 1	37762 0	70077 0	00006 1	12124 0
17,2120	12012 1	11745 1	12114 0	12012 1	46311 0	26030 0	42614 1	00006 1
17,2130	03012 1	47763 0	55753 0	55754 1	37767 0	00006 1	01005 0	00006 1
17,2140	32143 0	52006 0	C; 03606 1	C; 42066 1	04736 1	04736 1	04736 1	04736 1
17,2150	04736 1	04736 1	04736 1	04736 1	04736 1	C; 03236 0	C; 42066 1	31746 0
17,2160	55744 0	37763 1	55745 1	31765 1	55764 1	00006 1	32172 1	52006 0
17,2170	04736 1	C; 02232 0	C; 40066 0	40376 1	62264 0	00006 1	12243 1	00006 1
17,2200	00030 1	40000 0	77762 1	00006 1	12243 1	40302 1	62265 1	00006 1
17,2210	12243 1	41074 1	62266 1	00006 1	12257 1	00006 1	41760 0	52073 1
17,2220	53762 1	00006 1	30025 0	20073 1	37746 0	60000 1	60073 0	54073 1
17,2230	37767 0	67771 1	26072 0	30072 1	00006 1	12247 0	00006 1	31762 0
17,2240	52073 1	37745 0	55763 0	31756 1	54003 0	05225 1	C; 40264 0	40073 1
17,2250	61763 1	00006 1	62236 1	05663 1	C; 02236 1	C; 36066 1	05727 0	41075 0
17,2260	62267 0	00006 1	12241 0	12215 1	C; 05221 0	C; 00071 1	C; 02072 0	C; 16063 0
17,2270	04736 1	12413 1	12365 1	12413 1	61501 1	00006 1	62270 0	11424 0
17,2300	12311 1	12303 1	12316 0	41423 1	55437 1	61500 0	00006 1	63426 1
17,2310	13424 1	61501 1	00006 1	62303 0	03515 0	13344 0	61501 1	00006 1
17,2320	62303 0	03511 1	00006 1	61424 1	13373 1	61501 1	00006 1	62270 0
17,2330	11424 0	12342 1	12334 0	12347 1	31423 0	55437 1	61500 0	00006 1
17,2340	63265 0	13263 1	61501 1	00006 1	62334 1	03511 1	13443 0	61501 1
17,2350	00006 1	62334 1	03515 0	13301 1	61501 1	00006 1	62413 0	31424 1
17,2360	55437 1	61500 0	00006 1	63227 0	13225 0	61501 1	00006 1	62413 0
17,2370	41424 0	55437 1	61500 0	00006 1	63412 0	13410 0	11437 1	67763 1

OCTAL LISTING OF PARAGRAPH # 115, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

17,2400	12402 1	67763 1	00006 1	00066 0	00006 1	77760 0	30001 0	00006 1
17,2410	12557 0	55612 1	12457 1	37767 0	55474 0	55473 1	55475 1	55612 1
17,2420	37755 1	00006 1	02031 1	00006 1	12441 0	37754 0	00006 1	02031 1
17,2430	00006 1	12443 1	37756 1	00077 0	10000 0	12441 0	37767 0	06046 0
17,2440	15733 1	37745 0	12444 0	37743 0	54071 0	37767 0	54072 0	54073 1
17,2450	00006 1	32455 1	54070 1	52006 0	C; 02447 1	C; 40066 0	55612 1	41612 1
17,2460	62556 0	00006 1	62464 0	12413 1	31612 0	55475 1	62555 0	00006 1
17,2470	62475 0	31471 1	06046 0	15733 1	C; 02102 0	31471 1	00006 1	02005 0
17,2500	00006 1	12526 0	67745 0	00006 1	61471 1	54001 1	00006 1	12531 0
17,2510	31472 1	77743 1	00006 1	12517 1	32566 0	27475 1	12544 1	40001 1
17,2520	67745 0	57472 1	55473 1	32566 0	55474 0	12544 1	32566 0	27475 1
17,2530	12542 1	31472 1	77743 1	00006 1	12536 1	12542 1	32565 0	27475 1
17,2540	00006 1	62553 0	37767 0	55474 0	32474 1	55653 1	31471 1	06046 0
17,2550	00006 1	32606 0	52006 0	41475 1	12527 1	C; 77417 0	C; 00014 1	C; 31000 0
17,2560	C; 37776 0	C; 37775 0	C; 37773 0	C; 00010 0	C; 00600 1	C; 77757 1	C; 00013 0	04736 1
17,2570	C; 43415 0	C; 20000 0	C; 02000 0	C; 77557 0	C; 00220 1	C; 77537 0	C; 40652 0	C; 00201 1
17,2600	C; 40042 0	C; 40210 0	C; 00104 1	C; 40104 0	C; 40021 0	C; 03402 1	C; 34066 0	C; 02376 1
17,2610	00006 1	32617 0	52006 0	04736 1	C; 07400 1	C; 03533 1	C; 03573 0	C; 42066 1
17,2620	30033 1	00006 1	20767 0	54061 1	00006 1	71405 0	57413 0	30034 0
17,2630	00006 1	20770 0	54062 1	00006 1	71401 1	27413 1	55467 1	30061 0
17,2640	00006 1	71406 0	57411 1	30062 0	00006 1	71403 0	27411 0	55470 1
17,2650	12715 1	37762 0	70077 0	10000 0	12413 1	00006 1	00012 1	72614 1
17,2660	10000 0	12413 1	00006 1	00005 1	00006 1	12413 1	37767 0	00006 1
17,2670	01005 0	00006 1	32675 1	52006 0	C; 03604 0	C; 42066 1	04736 1	12715 1
17,2700	50066 1	11467 1	62714 1	12705 0	62714 1	00006 1	62710 0	12715 1
17,2710	10066 0	04736 1	04736 1	C; 77512 1	C; 77601 0	10077 0	13526 1	12720 1
17,2720	32615 1	54062 1	06013 0	40775 0	61416 0	55423 1	40776 0	61420 0
17,2730	55424 0	37763 1	54061 1	50061 0	31423 0	00006 1	77761 1	00006 1
17,2740	12742 0	13010 1	10001 1	67762 0	12746 1	40000 0	67771 1	55407 1
17,2750	00006 1	70000 0	55412 0	00006 1	50061 0	71717 0	00006 1	60375 0
17,2760	55441 0	31412 1	00006 1	50061 0	71721 0	60375 0	55460 0	11407 1
17,2770	31411 1	12773 1	13015 1	27441 0	11407 1	11441 0	13003 0	11441 0

OCTAL LISTING OF PARAGRAPH # 116, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

17,3000	13021 0	13021 0	13003 0	31407 0	00006 1	77751 1	61441 1	13043 1
17,3010	10000 0	37743 0	12747 0	47743 1	12747 0	41441 0	61411 1	55441 0
17,3020	12714 0	11441 0	41460 0	13025 1	31460 1	61411 1	55460 0	11407 1
17,3030	11460 0	13036 0	11460 0	13042 0	13042 0	13036 0	00006 1	33117 0
17,3040	53503 1	13047 0	31460 1	00006 1	50061 0	71717 0	53503 1	10061 1
17,3050	13052 1	13120 0	54061 1	00006 1	31503 0	53505 1	53412 0	53414 0
17,3060	55411 0	31407 0	55410 1	12733 0	11504 0	63115 1	13070 1	63115 1
17,3070	00006 1	63073 0	13126 0	31502 1	00006 1	77756 0	23502 1	31503 0
17,3100	00006 1	77756 0	27502 0	31504 1	00006 1	77756 0	23504 1	31505 0
17,3110	00006 1	77756 0	27504 0	31477 1	13127 1	C; 77400 0	C; 00000 1	C; 00000 1
17,3120	11502 0	63115 1	13124 1	63115 1	00006 1	63064 0	31476 0	54066 0
17,3130	11660 1	41502 0	13134 0	31502 1	00006 1	63142 0	31725 0	00006 1
17,3140	11502 0	55502 0	11661 0	41504 0	13146 0	31504 1	00006 1	63154 1
17,3150	31726 0	00006 1	11504 0	55504 0	31502 1	00006 1	13310 1	00006 1
17,3160	73325 1	61504 1	00006 1	73323 1	55510 0	41504 0	00006 1	73325 1
17,3170	61502 1	00006 1	73323 1	55511 1	61510 1	55506 1	41511 1	61510 1
17,3200	55507 0	31511 0	00006 1	63326 0	31510 1	00006 1	63252 1	31507 1
17,3210	00006 1	63233 0	31722 1	55633 1	00006 1	31414 1	53412 0	31410 0
17,3220	55407 1	30066 1	61504 1	00006 1	63227 0	47763 0	13431 0	11671 1
17,3230	13225 0	47762 1	13431 0	31723 0	55633 1	31502 1	61504 1	60066 1
17,3240	00006 1	63245 1	03445 1	36311 1	13431 0	11673 0	13242 1	03445 1
17,3250	37762 0	13431 0	31506 0	00006 1	63271 0	31721 1	55633 1	30066 1
17,3260	61502 1	00006 1	63265 0	47766 0	13431 0	11667 0	13263 1	46306 0
17,3270	13431 0	31724 1	55633 1	41504 0	61502 1	60066 1	00006 1	63303 1
17,3300	03437 1	37766 1	13431 0	11674 1	13300 0	03437 1	37761 0	13431 0
17,3310	31504 1	00006 1	12651 0	00006 1	73324 0	55511 1	31504 1	00006 1
17,3320	73323 1	55510 0	13176 0	C; 35441 0	C; 14176 1	C; 62575 1	31510 1	00006 1
17,3330	63353 1	31506 0	00006 1	63416 1	31724 1	55633 1	41502 0	61504 1
17,3340	60066 1	00006 1	63346 0	03437 1	37765 1	13431 0	11675 0	13343 1
17,3350	03437 1	36306 1	13431 0	31507 1	00006 1	63375 0	31723 0	55633 1
17,3360	40066 0	61502 1	61504 1	00006 1	63372 1	11672 1	13372 0	03445 1
17,3370	37767 0	13431 0	03445 1	37763 1	13431 0	31722 1	55633 1	00006 1

OCTAL LISTING OF PARAGRAPH # 117, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

17,3400	31414 1	53412 0	31410 0	55407 1	41504 0	60066 1	00006 1	63412 0
17,3410	46311 0	13431 0	11670 0	13410 0	47761 1	13431 0	31721 1	55633 1
17,3420	41502 0	60066 1	00006 1	63426 1	47765 0	13431 0	11666 1	13424 1
17,3430	47760 0	54061 1	00006 1	33436 0	52006 0	C; 02321 0	C; 40066 0	31713 0
17,3440	54066 0	41411 0	55411 0	41423 1	13450 1	31707 0	54066 0	31423 0
17,3450	61424 1	00006 1	73525 1	55407 1	00006 1	77761 1	00006 1	13465 1
17,3460	10000 0	37743 0	13466 1	47743 1	13466 1	30001 0	55407 1	00006 1
17,3470	70000 0	55412 0	31411 1	61413 0	00006 1	73525 1	55411 0	00002 0
17,3500	C; 77545 0	C; 00014 1	C; 77757 1	C; 00050 1	C; 77733 0	C; 34344 0	C; 31221 1	C; 01552 1
17,3510	C; 31000 0	31707 0	54066 0	31423 0	13520 1	31713 0	54066 0	41423 1
17,3520	61424 1	00006 1	73525 1	55437 1	00002 0	C; 26501 1	00006 1	33532 0
17,3530	52006 0	C; 03417 0	C; 42066 1	41407 1	00006 1	63541 1	55407 1	41411 0
17,3540	55411 0	31412 1	00006 1	70066 0	61411 1	00006 1	60375 0	55444 0
17,3550	00006 1	63617 1	31407 0	00006 1	70066 0	20001 1	55510 0	63500 1
17,3560	00006 1	63564 0	37746 0	12456 0	41444 0	61631 1	00006 1	63646 0
17,3570	31510 1	63504 0	00006 1	63576 0	63503 1	13742 1	11407 1	00006 1
17,3600	12413 1	00006 1	12413 1	31607 1	00006 1	13613 1	30775 1	55416 1
17,3610	31610 1	00006 1	13615 1	30776 1	55420 1	33501 0	12456 0	31412 1
17,3620	00006 1	71633 1	61411 1	60375 0	61630 0	00006 1	63630 1	12413 1
17,3630	43505 0	61407 0	00006 1	63635 1	12413 1	41407 1	00006 1	70066 0
17,3640	20001 1	55510 0	41444 0	61411 1	61411 1	61631 1	55444 0	30066 1
17,3650	27633 1	00006 1	73506 0	61444 1	00006 1	63734 1	30066 1	60000 1
17,3660	00006 1	70000 0	53514 1	31444 1	22007 0	00006 1	11633 1	55727 0
17,3670	00006 1	71514 1	55514 1	37767 0	57513 1	00006 1	71727 0	21514 1
17,3700	00006 1	31514 0	53512 1	33500 1	61510 1	00006 1	70000 0	21514 1
17,3710	31513 1	00006 1	13714 1	13715 0	31514 0	00006 1	63562 0	33502 0
17,3720	61510 1	00006 1	63746 1	33733 0	55000 1	00006 1	00005 1	55654 0
17,3730	31471 1	06046 0	15733 1	C; 03214 0	33505 1	63507 0	00006 1	70066 0
17,3740	20001 1	61510 1	60000 1	00006 1	73510 1	12456 0	00006 1	31512 0
17,3750	53514 1	33502 0	61510 1	00006 1	70000 0	21514 1	31513 1	00006 1
17,3760	13762 0	13763 1	31514 0	00006 1	63723 1	13615 1	C; 37777 1	C; 03767 1
17,3770	C; 03770 1	CKSM 64065 0	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 120, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "1" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

20,2000	30034 0	05355 1	55404 1	30034 0	05354 0	55457 1	30032 0	05355 1
20,2010	55401 1	41401 1	00006 1	71457 1	55406 0	30032 0	05354 0	55403 0
20,2020	00006 1	71457 1	55405 0	41457 1	67746 0	00006 1	62031 1	37746 0
20,2030	55457 1	31403 1	00006 1	77746 1	00006 1	11457 1	55400 0	41401 1
20,2040	00006 1	77746 1	00006 1	11457 1	55402 1	15733 1	36110 1	54375 1
20,2050	41755 0	70077 0	54077 0	00002 0	36111 0	54375 1	40077 0	77755 0
20,2060	26077 0	00002 0	40077 0	77756 0	26077 0	00002 0	47756 0	70077 0
20,2070	54077 0	00002 0	12106 0	77746 1	26077 0	35632 0	56003 1	54776 0
20,2100	00006 1	31416 0	52775 0	31420 0	56776 1	54003 0	00006 1	30034 0
20,2110	52770 0	30032 0	54766 1	00002 0	47746 1	70077 0	54077 0	37767 0
20,2120	54774 1	54775 0	54776 0	54771 1	54772 1	54773 0	12106 0	35632 0
20,2130	56003 1	54066 0	47754 1	70077 0	54077 0	37771 1	55732 1	33420 1
20,2140	55631 0	55632 0	55630 1	37743 0	55725 1	55726 1	33744 0	55721 0
20,2150	55722 0	55723 1	55724 0	32174 1	55650 1	37767 0	51650 0	55660 1
20,2160	11650 1	12154 1	33423 1	55640 0	55641 1	00006 1	33434 1	53643 0
20,2170	30066 1	54003 0	00002 0	C; 00033 1	C; 00015 0	35632 0	56003 1	55312 1
20,2200	47767 1	55732 1	36106 0	13057 1	40077 0	77762 1	26077 0	42225 1
20,2210	55631 0	37767 0	55630 1	00006 1	32312 0	53477 0	00006 1	32314 0
20,2220	53501 0	32224 1	55655 1	12235 0	C; 76615 1	C; 00067 0	30003 1	55312 1
20,2230	36105 0	13767 0	47760 0	70076 1	54076 1	00006 1	30025 0	53312 1
20,2240	31340 1	55341 1	36107 1	54375 1	45210 0	00006 1	02011 0	67747 1
20,2250	00006 1	01011 0	40075 1	77757 1	26075 1	35661 0	54003 0	31337 1
20,2260	55511 1	22003 1	00002 0	13064 1	02127 1	00006 1	30025 0	53312 1
20,2270	00006 1	22376 0	40077 0	77762 1	26077 0	36106 0	55310 0	45210 0
20,2300	00006 1	02011 0	67746 0	00006 1	01011 0	47757 1	70075 1	54075 1
20,2310	13045 1	C; 77767 1	C; 77377 1	C; 77001 0	C; 77555 1	22002 0	02277 1	22002 0
20,2320	12127 0	37767 0	54070 1	54071 0	54072 0	54073 1	37755 1	00006 1
20,2330	02031 1	00006 1	12415 1	37754 0	00006 1	02031 1	00006 1	12422 0
20,2340	32606 0	70077 0	10000 0	12411 0	50061 0	32626 1	54001 1	75342 0
20,2350	54063 0	37756 1	00006 1	70001 1	54064 1	50063 1	32704 0	10000 0
20,2360	54065 0	12364 0	54072 0	12360 1	70102 0	10000 0	12370 0	12427 0
20,2370	00006 1	26063 0	10064 1	12354 0	37767 0	00006 1	01005 0	00006 1

OCTAL LISTING OF PARAGRAPH # 121, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "e" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

20,2400	01006 0	35660 1	05505 1	C; 02113 0	C; 16066 0	47751 1	70077 0	54077 0
20,2410	15733 1	40077 0	77756 0	10000 0	12417 0	37745 0	54071 0	50061 0
20,2420	32646 1	12346 0	37743 0	54071 0	50061 0	32666 0	12346 0	30065 1
20,2430	00006 1	77760 0	50000 1	32607 1	55607 0	30001 0	00006 1	77760 0
20,2440	50000 1	32607 1	55610 0	30065 1	74564 0	67745 0	55471 0	37762 0
20,2450	54064 1	10071 0	12456 0	12543 0	37762 0	12457 1	37766 1	54063 0
20,2460	10072 0	12526 0	40077 0	77760 0	10000 0	12526 0	50063 1	32676 1
20,2470	54065 0	70102 0	10000 0	12524 1	10072 0	12514 1	10070 1	12510 0
20,2500	41762 1	60064 0	00006 1	12506 1	10073 1	12542 1	30065 1	12543 0
20,2510	30065 1	00006 1	01005 0	15733 1	30065 1	54073 1	71471 0	10000 0
20,2520	12526 0	30065 1	27471 0	12535 1	10073 1	12542 1	00006 1	26063 0
20,2530	10064 1	12540 0	10072 0	12535 1	12374 1	37767 0	54072 0	12447 0
20,2540	54064 1	12466 0	67763 1	67745 0	55472 0	37763 1	70061 1	10000 0
20,2550	12553 1	00006 1	24061 0	11607 0	12556 1	12567 0	10000 0	12561 0
20,2560	12564 0	10000 0	24061 0	12576 0	00006 1	26061 1	12576 0	11610 0
20,2570	77762 1	12573 0	77762 1	00006 1	12576 0	24061 0	50061 0	31706 1
20,2600	54066 0	32605 0	54001 1	30062 0	52006 0	C; 36066 1	C; 00240 1	C; 00000 1
20,2610	C; 00001 0	C; 77776 1	C; 00002 0	C; 77775 1	C; 00004 0	C; 77773 1	C; 03003 1	C; 04004 1
20,2620	C; 03010 0	C; 04011 0	C; 03015 0	C; 04016 1	C; 03022 1	C; 04023 1	C; 02026 1	C; 02026 1
20,2630	C; 02031 1	C; 02031 1	C; 02034 1	C; 02034 1	C; 02037 1	C; 02037 1	C; 03043 0	C; 04044 0
20,2640	C; 03050 1	C; 04051 1	C; 03055 1	C; 04056 0	C; 03062 0	C; 04063 0	C; 01025 1	C; 02026 1
20,2650	C; 01030 0	C; 02031 1	C; 01033 0	C; 02034 1	C; 01036 0	C; 02037 1	C; 03067 0	C; 04070 1
20,2660	C; 03074 1	C; 04075 1	C; 03101 1	C; 04102 0	C; 03106 0	C; 04107 0	C; 01111 1	C; 02112 1
20,2670	C; 01114 1	C; 02115 0	C; 01117 1	C; 02120 0	C; 01122 1	C; 02123 0	C; 00042 1	C; 00210 1
20,2700	C; 00252 1	C; 00104 1	C; 00021 1	C; 00125 1	C; 14025 0	C; 14203 0	C; 14221 0	C; 14007 0
20,2710	C; 24227 0	C; 20051 1	C; 20102 0	C; 20141 1	C; 20012 0	C; 30152 1	C; 01641 0	C; 01406 1
20,2720	C; 01445 0	C; 01602 1	C; 02646 1	C; 02121 1	C; 02013 1	C; 02103 1	C; 02031 1	C; 03133 0
20,2730	C; 73372 0	C; 73176 0	C; 62172 1	C; 66676 0	C; 66766 0	C; 55666 1	C; 67375 1	C; 67336 0
20,2740	C; 56335 1	C; 72756 0	C; 72774 0	C; 61754 0	C; 14025 0	C; 14221 0	C; 14007 0	C; 14203 0
20,2750	C; 24227 0	C; 20102 0	C; 20141 1	C; 20012 0	C; 20051 1	C; 30152 1	C; 01406 1	C; 01445 0
20,2760	C; 01602 1	C; 01641 0	C; 02646 1	C; 02121 1	C; 02103 1	C; 02031 1	C; 02013 1	C; 03133 0
20,2770	C; 14203 0	C; 14221 0	C; 14007 0	C; 14025 0	C; 24227 0	C; 20051 1	C; 20141 1	C; 20012 0

OCTAL LISTING OF PARAGRAPH # 122, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

20,3000	C: 20102 0	C: 30152 1	C: 01641 0	C: 01445 0	C: 01602 1	C: 01406 1	C: 02646 1	C: 02013 1
20,3010	C: 02103 1	C: 02031 1	C: 02121 1	C: 03133 0	C: 73176 0	C: 73372 0	C: 62172 1	C: 66766 0
20,3020	C: 66676 0	C: 55666 1	C: 67336 0	C: 67375 1	C: 56335 1	C: 72774 0	C: 72756 0	C: 61754 0
20,3030	C: 37775 0	C: 02255 1	C: 34066 0	33030 1	54030 0	22016 0	00006 1	22012 1
20,3040	00006 1	33032 0	53001 0	03105 0	15733 1	35632 0	56003 1	54066 0
20,3050	37745 0	55744 0	37767 0	55745 1	30066 1	54003 0	00002 0	55310 0
20,3060	00006 1	30025 0	53760 0	12204 1	00006 1	22376 0	35632 0	56003 1
20,3070	55756 0	31763 1	00006 1	63076 0	05225 1	C: 36173 1	31756 1	54003 0
20,3100	12264 1	54771 1	03105 0	15733 1	04736 1	41612 1	63413 1	00006 1
20,3110	63126 1	31612 0	00006 1	77757 1	30001 0	00006 1	73210 0	55612 1
20,3120	00006 1	22066 1	03140 1	37767 0	55612 1	00066 1	40000 0	54062 1
20,3130	33211 0	55612 1	00006 1	22066 1	03140 1	30062 0	55612 1	00066 1
20,3140	00006 1	71607 0	30001 0	00006 1	71614 1	55605 1	27624 1	31612 0
20,3150	00006 1	71610 0	30001 0	00006 1	71615 0	55606 1	27625 0	11732 1
20,3160	13167 0	41605 1	55622 1	27624 1	41606 1	55623 0	27625 0	31641 0
20,3170	00006 1	71612 1	61643 1	00006 1	77760 0	22061 0	31605 0	00006 1
20,3200	70061 1	55605 1	31606 0	00006 1	70061 1	55606 1	00002 0	C: 00632 0
20,3210	C: 24366 1	C: 03146 1	C: 77754 1	C: 00240 1	33030 1	54030 0	22016 0	00006 1
20,3220	22012 1	00006 1	33032 0	53001 0	00006 1	41512 1	05270 1	C: 54525 1
20,3230	61510 1	60000 1	00006 1	73244 1	55612 1	63212 0	55475 1	03105 0
20,3240	31654 1	71471 0	05225 1	C: 36500 1	C: 31000 0	31650 0	00006 1	13376 1
20,3250	63427 0	00006 1	63254 1	13402 0	33416 1	00006 1	71650 1	37747 1
20,3260	60001 0	54062 1	33417 0	00006 1	71650 1	33424 0	60001 0	54061 1
20,3270	40000 0	67743 0	55642 1	00006 1	77750 0	55643 0	30061 0	00006 1
20,3300	73425 0	55640 0	55641 1	40061 1	00006 1	73421 1	63422 0	60000 1
20,3310	54061 1	30062 0	00006 1	71660 1	55660 1	30062 0	00006 1	71661 0
20,3320	55661 0	40062 1	00006 1	77747 0	67747 1	54062 1	41416 1	57626 1
20,3330	00006 1	61624 0	61416 0	00006 1	70062 1	27660 1	41420 1	57627 0
20,3340	00006 1	61625 1	61420 0	00006 1	70062 1	27661 0	31660 0	61661 1
20,3350	00006 1	73426 0	55662 0	41660 1	61661 1	00006 1	73426 0	55663 1
20,3360	30061 0	00006 1	71660 1	55664 0	30061 0	00006 1	71661 0	55665 1
20,3370	37762 0	27650 1	00006 1	41623 0	53625 0	15735 1	37762 0	55650 1

OCTAL LISTING OF PARAGRAPH # 123, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

20,3400	37767 0	13261 0	00006 1	33431 1	53643 0	33425 1	55640 0	55641 1	
20,3410	33422 0	54061 1	35210 1	54062 1	13311 0	C; 00000 1	C; 00024 1	C; 00027 1	
20,3420	C; 00111 0	C; 01463 1	C; 03146 1	C; 12000 1	C; 16051 1	C; 24000 1	C; 26501 1	C; 77160 0	
20,3430	C; 00000 1	C; 00000 1	C; 00310 0	C; 20000 0	C; 02000 0	05270 1	C; 40162 0	15727 1	
20,3440	36311 1	54144 1	00006 1	77761 1	22146 1	50144 0	31614 0	54150 1	
20,3450	50144 0	61660 0	54151 0	63753 0	00006 1	63754 1	03762 1	50146 1	
20,3460	55676 0	50144 0	41660 1	54147 1	60150 0	54151 0	63753 0	00006 1	
20,3470	63756 0	03762 1	50146 1	55700 0	30150 0	60000 1	54150 1	60147 0	
20,3500	54151 0	03762 1	50146 1	55701 1	40147 1	60150 0	54151 0	03762 1	
20,3510	50146 1	55677 1	10144 1	13441 1	37754 0	70077 0	10000 0	13531 1	
20,3520	31676 1	55717 0	31702 0	55720 1	00004 0	40077 0	77761 1	26077 0	
20,3530	15567 1	36311 1	54144 1	60000 1	54145 0	60000 1	54146 0	50144 0	
20,3540	11660 1	67763 1	13544 0	67763 1	54151 0	63753 0	00006 1	63760 0	
20,3550	03762 1	50144 0	55721 0	40144 1	67762 0	00006 1	63703 0	40151 0	
20,3560	50144 0	54152 0	61655 0	50144 0	61614 0	00006 1	63630 1	37767 0	
20,3570	50145 1	55666 1	50144 0	31660 0	00006 1	63613 0	50146 1	31700 1	
20,3600	50144 0	55717 0	22007 0	50146 1	31676 1	00006 1	50146 1	11700 0	
20,3610	50144 0	55725 1	13654 1	50146 1	31676 1	22007 0	50144 0	55717 0	
20,3620	50146 1	31700 1	00006 1	50146 1	11676 0	50144 0	55725 1	13700 1	
20,3630	37763 1	00004 0	50145 1	55666 1	50144 0	31660 0	00006 1	63663 1	
20,3640	50146 1	31701 0	50144 0	55717 0	22007 0	50146 1	31676 1	00006 1	
20,3650	50146 1	11701 1	50144 0	55725 1	37767 0	50145 1	57666 0	50145 1	
20,3660	55667 0	00003 1	13703 1	00003 1	50146 1	31677 0	22007 0	50144 0	
20,3670	55717 0	50146 1	31700 1	00006 1	50146 1	11677 1	50144 0	55725 1	
20,3700	37767 0	50145 1	55667 0	10144 1	13532 1	00004 0	55672 1	55673 0	
20,3710	55674 1	55675 0	31614 0	00006 1	77746 1	61655 0	60152 1	00006 1	
20,3720	63731 1	31615 1	00006 1	77746 1	61655 0	60153 0	00006 1	63742 0	
20,3730	13525 1	11660 1	13737 0	04736 1	55674 1	55675 0	13721 1	55673 0	
20,3740	55674 1	13721 1	11661 0	13750 1	C; 11642 1	55672 1	55674 1	13525 1	
20,3750	55673 0	55675 0	13525 1	C; 77456 0	33744 0	13457 0	33744 0	13472 1	
20,3760	33744 0	13551 1	37755 1	22007 0	00006 1	10151 0	00002 0	55310 0	
20,3770	00006 1	33774 0	52006 0	C; 02157 0	C; 36066 1	C; 03775 1	C; 03776 1	CKSM 43061 1	

OCTAL LISTING OF PARAGRAPH # 124, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

21,2000	32402 0	54030 0	22016 0	00006 1	22012 1	00006 1	32100 1	53001 0
21,2010	32014 0	55544 1	13675 1	C; 02322 0	C; 02060 0	32402 0	54030 0	22016 0
21,2020	00006 1	22012 1	00006 1	31575 1	53001 0	41000 1	62406 1	00006 1
21,2030	12032 0	12034 0	32401 0	54030 0	53575 0	53603 1	53601 0	53577 1
21,2040	13703 1	06013 0	00006 1	30034 0	53541 1	00006 1	00004 0	54001 1
21,2050	00006 1	06004 0	00006 1	12057 0	00006 1	00004 0	54001 1	01544 0
21,2060	40001 1	61543 1	23543 1	00006 1	62067 1	67744 1	67744 1	00006 1
21,2070	77755 0	42376 0	00006 1	00001 1	13707 0	11547 1	12102 1	C; 02255 1
21,2100	C; 34066 0	12113 1	46311 0	27547 1	00006 1	51547 0	32413 0	53551 0
21,2110	51547 0	32414 1	55552 0	37762 0	54066 0	12121 0	37767 0	54066 0
21,2120	06013 0	50066 1	53554 0	52073 1	50066 1	53560 1	52062 1	50066 1
21,2130	53564 0	52064 1	50066 1	31567 1	57570 1	30063 1	00006 1	71542 1
21,2140	00006 1	77752 1	60061 0	00006 1	71542 1	00006 1	77753 0	20073 1
21,2150	31570 1	00006 1	71542 1	54065 0	00006 1	77755 0	60063 1	00006 1
21,2160	71542 1	00006 1	77751 1	20062 1	30065 1	00006 1	77754 1	20064 1
21,2170	00006 1	30073 0	02307 1	10066 0	50000 1	31540 1	00006 1	20065 0
21,2200	55545 0	40073 1	60000 1	57546 1	00006 1	31546 1	22065 1	00006 1
21,2210	71550 1	20073 1	30065 1	00006 1	71550 1	26073 1	54001 1	12221 0
21,2220	26072 0	31545 1	00006 1	77754 1	22065 1	31546 1	00006 1	77754 1
21,2230	60065 1	22065 1	00006 1	71551 0	20062 1	30065 1	00006 1	71551 0
21,2240	26062 1	54001 1	12244 0	26061 1	31545 1	00006 1	77755 0	22065 1
21,2250	31546 1	00006 1	77755 0	60065 1	22065 1	00006 1	71552 0	20064 1
21,2260	30065 1	00006 1	71552 0	26064 1	54001 1	12267 1	26063 0	52073 1
21,2270	50066 1	53554 0	52062 1	50066 1	53560 1	52064 1	50066 1	53564 0
21,2300	10066 0	12116 1	41000 1	62406 1	00006 1	12603 1	15733 1	20001 1
21,2310	10000 0	67763 1	12314 1	40000 0	54065 0	12321 1	50000 1	37744 1
21,2320	26065 0	00002 0	23543 1	32400 1	55547 1	32014 0	55544 1	00006 1
21,2330	32404 0	53575 0	00006 1	32100 1	53577 1	00006 1	32100 1	53603 1
21,2340	00006 1	32407 0	53601 0	00006 1	32411 1	53573 0	31540 1	00006 1
21,2350	77746 1	53554 0	31541 0	00006 1	77746 1	53556 1	37767 0	12363 1
21,2360	55560 1	55561 0	55562 0	55563 1	55564 0	55565 1	55566 1	55567 0
21,2370	55571 1	55523 0	55525 0	55735 0	55735 0	15733 1	C; 24366 1	C; 14000 1

OCTAL LISTING OF PARAGRAPH # 125, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

21,2400	C; 00132 1	C; 37776 0	C; 37775 0	C; 02544 0	C; 42066 1	C; 02255 1	C; 02572 0	C; 42066 1
21,2410	C; 02015 1	C; 42066 1	C; 02352 1	C; 00203 0	C; 00665 1	C; 04136 1	C; 00553 1	C; 03164 1
21,2420	C; 04231 0	C; 00601 0	C; 03423 1	C; 04330 0	C; 00631 0	C; 03707 1	C; 04431 0	C; 00664 0
21,2430	C; 04224 1	C; 04535 0	C; 00721 0	C; 04575 1	C; 04644 0	C; 00761 1	C; 05207 1	C; 04756 1
21,2440	C; 01024 0	C; 05665 1	C; 05072 1	C; 01072 0	C; 06416 1	C; 05207 1	C; 01142 1	C; 07224 1
21,2450	C; 05325 0	C; 01216 0	C; 10116 0	C; 05442 0	C; 01274 1	C; 11073 0	C; 05553 1	C; 01353 0
21,2460	C; 12134 1	C; 05656 1	C; 01433 1	C; 13245 0	C; 05747 0	C; 01511 0	C; 14404 1	C; 06023 0
21,2470	C; 01561 1	C; 15524 0	C; 06060 1	C; 01622 0	C; 16535 0	C; 06074 1	C; 01646 1	C; 17323 0
21,2500	C; 06076 0	C; 01654 1	C; 17536 1	C; 06100 0	C; 01646 1	C; 17266 0	C; 06126 1	C; 01635 0
21,2510	C; 16267 0	C; 06225 1	C; 01636 0	C; 14600 1	C; 06425 1	C; 01674 0	C; 12552 0	C; 06753 0
21,2520	C; 02022 0	C; 10356 0	C; 07447 1	C; 02300 0	C; 06204 1	C; 10340 1	C; 02767 0	C; 04210 0
21,2530	C; 11461 1	C; 04030 0	C; 02466 1	C; 13107 0	C; 05760 0	C; 01255 1	C; 15114 1	C; 11614 1
21,2540	C; 00372 1	C; 17234 1	C; 22205 0	C; 00035 1	32401 0	54030 0	22016 0	00006 1
21,2550	22012 1	00006 1	32411 1	53001 0	41735 0	55535 1	41733 0	55533 1
21,2560	15733 1	11515 0	12567 0	32571 0	00006 1	05014 1	37763 1	55515 0
21,2570	00002 0	C; 70000 0	32402 0	54030 0	22016 0	00006 1	22012 1	00006 1
21,2600	32411 1	53001 0	12674 1	00006 1	31554 1	02307 1	00006 1	20767 0
21,2610	55467 1	00006 1	31556 0	02307 1	00006 1	20770 0	55470 1	00006 1
21,2620	31470 0	03264 1	53470 1	03274 0	57470 0	31561 1	54001 1	31557 1
21,2630	03264 1	55416 1	31561 1	54001 1	31557 1	03274 0	55420 1	31565 0
21,2640	54001 1	31563 0	03264 1	55417 0	31565 0	54001 1	31563 0	03274 0
21,2650	55421 0	31416 0	00006 1	72672 1	27467 1	31420 0	00006 1	72672 1
21,2660	27470 1	31417 1	00006 1	72673 0	27416 1	31421 1	00006 1	72673 0
21,2670	27420 1	15733 1	C; 00754 1	C; 01727 1	37762 0	70077 0	10000 0	12731 1
21,2700	13736 1	54066 0	50066 1	11467 1	62727 1	12707 1	62727 1	00006 1
21,2710	62712 1	13715 0	30066 1	60000 1	50000 1	11416 1	62730 1	12721 0
21,2720	62730 1	00006 1	62724 1	13715 0	10066 0	12701 1	13000 0	C; 77512 1
21,2730	C; 77423 1	00006 1	32756 1	53001 0	00006 1	32760 1	53573 0	00006 1
21,2740	30034 0	53430 0	00006 1	31470 0	57413 0	23411 1	37763 1	05663 1
21,2750	C; 02763 1	C; 42066 1	00006 1	32762 0	52006 0	C; 03033 1	C; 40066 0	C; 03642 1
21,2760	C; 34066 0	C; 02715 0	C; 36066 1	11736 0	12766 0	13745 0	37767 0	55523 0
21,2770	55525 0	55533 1	55535 1	03243 1	15727 1	04736 1	04736 1	C; 76504 1

OCTAL LISTING OF PARAGRAPH # 126, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "E" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
21,3000  31762 0   54066 0   13712 1   31767 0   54066 0   00006 1   50066 1   31527 0
21,3010  52062 1   00006 1   50066 1   31417 1   52064 1   10066 0   50000 1   31467 0
21,3020  00006 1   77755 0   22071 1   30061 0   62777 1   00006 1   63034 0   37746 0
21,3030  54072 0   37750 1   54073 1   13050 0   30061 0   00006 1   77757 1   22061 0

21,3040  30061 0   00006 1   70000 0   54062 1   37752 0   54072 0   37760 1   13032 1
21,3050  10064 1   63057 0   13054 1   63057 0   00006 1   63060 1   13071 0   C; 75120 0
21,3060  30063 1   00006 1   77757 1   22063 1   30064 0   00006 1   77760 0   22064 0
21,3070  13101 0   30072 1   00006 1   77747 0   54072 0   30073 0   00006 1   77756 0

21,3100  54073 1   30071 1   00006 1   70062 1   00006 1   70073 1   54070 1   30063 1
21,3110  00006 1   70061 1   00006 1   70072 0   54061 1   30064 0   00006 1   70000 0
21,3120  54072 0   10064 1   30072 1   13125 0   40072 0   60061 0   10000 0   37763 1
21,3130  13132 0   47763 0   54065 0   10065 0   30061 0   13137 0   40061 1   54061 1

21,3140  60072 1   57521 0   30072 1   00006 1   73304 1   60061 0   00006 1   70064 1
21,3150  26070 1   30021 1   60000 1   57540 1   31521 0   05417 0   23540 1   22021 1
21,3160  00006 1   71521 1   57540 1   10065 0   33305 1   13167 0   43305 0   00006 1
21,3170  71540 0   60070 0   10000 0   37763 1   13176 0   47763 0   50066 1   55523 0

21,3200  40000 0   00006 1   50066 1   71532 0   50066 1   23733 1   10066 0   01737 0
21,3210  41533 1   00006 1   71400 0   55567 0   41535 1   00006 1   71402 1   27567 0
21,3220  27567 0   41533 1   00006 1   71401 1   55571 1   41535 1   00006 1   71403 0
21,3230  27571 1   03243 1   15733 1   37767 0   55523 0   13240 0   37767 0   55525 0

21,3240  03243 1   15727 1   C; 07400 1   11523 0   37752 0   13247 1   37753 1   54066 0
21,3250  11525 0   37750 1   13254 0   37751 0   26066 0   43242 1   00006 1   03012 1
21,3260  30066 1   00006 1   05012 1   00002 0   22066 1   00006 1   71405 0   56066 1
21,3270  00006 1   71401 1   60066 1   00002 0   22066 1   00006 1   71406 0   56066 1

21,3300  00006 1   71403 0   60066 1   00002 0   C; 25253 1   C; 26501 1   C; 25253 1   54061 1
21,3310  50061 0   31532 1   00006 1   63373 0   54062 1   50061 0   31417 1   00006 1
21,3320  73403 1   56001 0   10061 1   50000 1   23664 1   50061 0   31417 1   00006 1
21,3330  13373 1   00006 1   63336 1   54066 0   37763 1   13341 0   40000 0   54066 0

21,3340  47763 0   50061 0   55523 0   00006 1   50061 0   71532 0   50061 0   23533 0
21,3350  30062 0   00006 1   71747 0   00006 1   60066 1   00006 1   63370 0   30066 1
21,3360  00006 1   50061 0   71750 0   00006 1   10062 1   00006 1   63373 0   13371 0
21,3370  31755 1   50002 0   00001 0   37767 0   50061 0   55523 0   00002 0   04736 1
```

OCTAL LISTING OF PARAGRAPH # 127, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

21,3400	C; 50437 1	C; 60777 0	C; 31000 0	C; 01146 0	11764 1	13410 0	31743 0	13612 0
21,3410	31766 1	13612 0	27522 1	54001 1	13416 0	27521 1	00002 0	40775 0
21,3420	61416 0	55423 1	61413 0	00006 1	63464 1	33571 1	54063 0	31423 0
21,3430	00006 1	73570 1	10000 0	13455 1	13436 1	13455 1	22000 1	00006 1
21,3440	70000 0	54062 1	61413 0	63571 1	00006 1	63472 0	31423 0	00006 1
21,3450	63461 1	60062 0	61413 0	55502 0	13474 1	37743 0	13437 0	37743 0
21,3460	13514 0	61413 0	55502 0	13474 1	41413 1	57413 0	41423 1	57423 0
21,3470	43571 0	13426 0	37767 0	55502 0	40776 0	61420 0	55424 0	61411 1
21,3500	00006 1	63535 1	33571 1	54064 1	31424 1	00006 1	73570 1	10000 0
21,3510	13457 0	13513 1	13457 0	22000 1	00006 1	70000 0	54062 1	61411 1
21,3520	63571 1	00006 1	63543 0	31424 1	00006 1	63532 0	60062 0	61411 1
21,3530	55504 0	13545 1	61411 1	55504 0	13545 1	41411 0	57411 1	41424 0
21,3540	57424 1	43571 0	13503 0	37767 0	55504 0	10064 1	41504 0	55504 0
21,3550	10063 0	41502 0	55502 0	33572 1	54062 1	37744 1	54066 0	55673 0
21,3560	55672 1	55675 0	55674 1	00006 1	33567 0	52006 0	C; 03154 1	C; 36066 1
21,3570	C; 00016 0	C; 77511 1	C; 03730 0	37762 0	70077 0	10000 0	15733 1	00006 1
21,3600	00012 1	73617 0	10000 0	15733 1	46311 0	26030 0	00006 1	32100 1
21,3610	53001 0	13404 0	55736 0	00006 1	33621 1	53573 0	15733 1	C; 07400 1
21,3620	C; 03622 1	C; 42066 1	33645 0	54030 0	22016 0	00006 1	22012 1	00006 1
21,3630	33644 1	53001 0	33635 1	55544 1	12042 1	C; 03636 1	23543 1	00006 1
21,3640	31541 0	53741 0	15733 1	C; 02000 0	C; 42066 1	C; 37773 0	C; 03647 1	37763 1
21,3650	54066 0	60000 1	54061 1	50066 1	31540 1	00006 1	50066 1	21740 1
21,3660	00006 1	77756 0	56001 0	00006 1	11542 1	50061 0	53560 1	10066 0
21,3670	13650 0	33674 1	55742 0	12323 0	C; 02075 1	37767 0	00006 1	01005 0
21,3700	33646 0	55742 0	12042 1	53575 0	11736 0	55736 0	12041 1	55542 1
21,3710	01742 1	12075 0	33720 1	55737 1	13005 0	11736 0	13722 1	12731 1
21,3720	C; 03003 1	C; 03726 1	33721 0	55737 1	37762 0	13727 1	37767 0	54066 0
21,3730	50066 1	11417 0	37763 1	13176 0	47763 0	13176 0	11764 1	13715 0
21,3740	13743 0	04736 1	04736 1	37763 1	12701 1	03307 0	37745 0	54063 0
21,3750	37762 0	03307 0	37745 0	54001 1	30063 1	53754 1	03243 1	11744 0
21,3760	13765 1	04736 1	13765 1	37745 0	55744 0	37767 0	55745 1	15727 1
21,3770	C; 37777 1	C; 03771 0	C; 03772 0	CKSM 64642 0	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 130, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
22,2000    03531 0    06112 0    I: 77745 1    C: 02047 0    C: 35307 0    C: 60436 0    I: 77776 1    04161 0
22,2010 C: 05022 1 C: 20000 0    06112 0    I: 77745 1    C: 05707 1    C: 25073 1    C: 05722 0 C: 02211 1
22,2020 C: 16167 0 C: 05722 0 C: 02055 0 I: 77776 1    33721 0    55402 1    03343 0    37743 0
22,2030    55562 0    55563 1    55404 1    01072 0    12234 1    12216 1 C: 00000 1 C: 02124 1

22,2040 C: 00032 0 C: 77664 0    12741 0    12234 1    12233 0 C: 00000 1 C: 02130 1 C: 00042 1
22,2050 C: 73465 1    13017 0    12234 1    12216 1 C: 00027 1 C: 02130 1 C: 00042 1 C: 77551 0
22,2060    13017 0    13271 1    12233 0 C: 00027 1 C: 02134 0 C: 00042 1 C: 77746 1    13017 0
22,2070    13312 0    12216 1 C: 00056 1 C: 02134 0 C: 00042 1 C: 77746 1    13017 0    12234 1

22,2100    12216 1 C: 00065 1 C: 02130 1 C: 00043 0 C: 77551 0    13017 0    13271 1    12233 0
22,2110 C: 00065 1 C: 02134 0 C: 00043 0 C: 77746 1    13017 0    13312 0    12216 1 C: 00114 0
22,2120 C: 02134 0 C: 00043 0 C: 77763 0    13043 1    13077 0    12442 0    13172 1    12702 1
22,2130    12210 1    12442 0    12615 0    13017 0    12210 1    13326 1    12615 0    13017 0

22,2140    00006 1    23406 1    41072 1    63706 0    00006 1    12152 1    04141 1 C: 00035 1
22,2150 C: 05022 1 C: 20000 0    03531 0    51072 0    30004 0    04122 1    00006 1    51072 0
22,2160    30003 1    53401 1    00006 1    41401 1    50110 1    52047 0    00006 1    31447 1
22,2170    53451 1    04161 0 C: 04022 0    00006 1    31307 1    53447 0    06112 0 I: 77775 1

22,2200 C: 01011 0 C: 26061 1 C: 01017 0 I: 77742 0 C: 02067 1 I: 77776 1    51401 0    10000 0
22,2210    04161 0 C: 04022 0    11402 1    12235 0    51072 0    10001 1    00006 1    31453 1
22,2220    53455 0    51400 1    33562 0    27454 1    04161 0 C: 04022 0    00006 1    31455 1
22,2230    53453 0    04161 0 C: 04022 0    01406 1    02140 0    00006 1    41451 1    52145 0

22,2240    00006 1    31447 1    20145 0    37750 1    07375 1    00006 1    31453 1    20145 0
22,2250    52145 0    53455 0    04161 0 C: 04022 0    00006 1    31455 1    53453 0    37743 0
22,2260    55524 1    55525 0    06112 0 I: 53575 0 C: 02061 1 C: 26012 0 C: 02357 1 I: 53435 0
22,2270 C: 02012 0 C: 26020 1 C: 02012 0 I: 76435 1 C: 02020 1 C: 26026 1 C: 02067 1 I: 76521 0

22,2300 C: 02012 0 C: 26075 1 C: 02061 1 I: 72441 0 C: 02357 1 C: 02103 1 I: 63316 0 C: 02061 1
22,2310 I: 50235 0 C: 02067 1 C: 02357 1 I: 77752 1 C: 26105 1 C: 02061 1 I: 77646 0 C: 02111 1
22,2320 I: 45316 1 I: 77766 0 C: 02107 0 I: 51025 1 C: 02111 1 C: 44332 0 I: 56345 0 C: 02107 0
22,2330 C: 02111 1 C: 02125 0 I: 56345 0 C: 02103 1 C: 02111 1 C: 02127 1 I: 67562 1 I: 52405 1

22,2340 C: 05740 1 C: 16115 0 C: 02103 1 I: 77671 1 C: 02107 0 C: 16131 0 C: 02101 0 I: 65271 0
22,2350 C: 02111 1 C: 02077 0 I: 65271 0 C: 02107 0 C: 02075 1 I: 77666 1 C: 16117 1 C: 02121 1
22,2360 I: 77716 1 I: 41205 0 C: 02127 1 C: 02125 0 I: 41325 0 C: 02123 0 C: 02117 1 I: 72471 0
22,2370 C: 02111 1 I: 57415 0 I: 41325 0 C: 02121 1 C: 02117 1 I: 77671 1 C: 02111 1 I: 41325 0
```

OCTAL LISTING OF PARAGRAPH # 131, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

22,2400	C; 02131	0	C; 02123	0	I; 77605	1	C; 02121	1	I; 72425	1	I; 77634	0	C; 33520	0	I; 63525	0
22,2410	C; 02111	1	I; 77665	1	C; 21203	0	I; 63525	0	C; 02123	0	I; 77605	1	C; 02111	1	I; 63525	0
22,2420	C; 02125	0	I; 63525	0	C; 02121	1	I; 41205	0	C; 02111	1	I; 45215	0	I; 77666	1	C; 02133	1
22,2430	I; 77776	1	37767	0	55512	1	55513	0	55520	0	55521	1	04161	0	C; 04022	0
22,2440	51401	0	10001	1	00006	1	51400	1	33606	1	53442	0	00006	1	51400	1
22,2450	33570	0	20001	1	52145	0	33736	0	07357	1	52145	0	53440	1	37754	0
22,2460	55443	1	00006	1	31523	1	52145	0	33732	1	07357	1	00006	1	51400	1
22,2470	33604	0	20001	1	52145	0	53436	0	33733	0	07357	1	00006	1	41515	0
22,2500	52145	0	21436	0	00006	1	51400	1	33576	0	20145	0	33732	1	07357	1
22,2510	00006	1	30145	1	53434	1	00006	1	31453	1	52145	0	00006	1	33711	0
22,2520	03352	0	00006	1	30145	1	53453	0	04161	0	C; 04022	0	06112	0	I; 41345	0
22,2530	C; 02053	0	C; 05735	0	I; 51715	0	C; 02111	1	C; 05572	1	I; 70362	1	C; 02053	0	I; 52115	0
22,2540	C; 02117	1	C; 05600	1	I; 70251	0	I; 41053	1	C; 05564	0	C; 45061	1	I; 52206	1	C; 02133	1
22,2550	I; 77600	1	C; 45057	1	C; 26147	1	I; 77626	0	C; 75636	0	I; 63545	0	C; 02107	0	I; 65205	0
22,2560	C; 02053	0	C; 02105	1	I; 64425	0	C; 05610	0	I; 45471	1	C; 75626	1	I; 77604	0	C; 45066	0
22,2570	I; 41345	0	C; 02153	1	C; 02111	1	I; 41325	0	C; 02151	0	C; 02107	0	I; 55525	0	C; 02147	1
22,2600	I; 76505	0	C; 02012	0	C; 02155	1	I; 77656	1	C; 16167	0	C; 00045	0	C; 02163	1	I; 77776	1
22,2610	51401	0	10002	1	54111	1	37766	1	55404	1	04161	0	C; 04022	0	00006	1
22,2620	41453	0	52145	0	33720	1	07357	1	00004	0	52145	0	53746	1	31447	1
22,2630	55723	1	31072	0	55724	0	55662	0	56003	1	54002	1	31402	0	00006	1
22,2640	77753	0	31401	0	74564	0	26001	1	00006	1	22003	1	31320	1	53726	1
22,2650	06112	0	I; 77745	1	C; 02163	1	C; 26330	0	C; 02167	0	C; 02332	1	I; 77776	1	00003	1
22,2660	25402	0	51072	0	40005	0	61452	0	00006	1	51401	0	60003	1	31072	0
22,2670	55405	0	04161	0	C; 04022	0	51405	1	67765	1	55072	1	37767	0	55402	1
22,2700	51405	1	10006	0	03531	0	06112	0	I; 43345	1	C; 05727	0	C; 01307	1	C; 26045	1
22,2710	C; 05722	0	C; 34404	0	C; 61137	0	I; 77776	1	33705	0	54003	0	04161	0	C; 04022	0
22,2720	00004	0	33741	0	54070	1	50070	0	31050	0	50070	0	55010	0	10070	1
22,2730	12722	0	00006	1	31445	0	53307	0	00006	1	31307	1	53327	1	00003	1
22,2740	01072	0	00006	1	31451	0	52145	0	00006	1	41447	0	20145	0	37750	1
22,2750	00006	1	77761	1	30001	0	07375	1	00006	1	31453	1	52145	0	52121	1
22,2760	05317	1	C; 00352	0	37767	0	54153	1	06112	0	I; 52315	1	C; 02167	0	C; 02175	0
22,2770	I; 74352	0	I; 77655	1	C; 02167	0	C; 15656	0	C; 02053	0	I; 41276	1	C; 05721	0	I; 77615	0

OCTAL LISTING OF PARAGRAPH # 132, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

22,3000	C; 01307 1	C; 02057 1	I; 77615 0	C; 05547 1	C; 02270 0	I; 77776 1	04161 0	C; 04022 0
22,3010	00006 1	31455 1	53453 0	03531 0	00006 1	33713 1	52006 0	10111 1
22,3020	13073 1	13023 1	13073 1	06112 0	I; 77775 1	C; 02167 0	C; 36233 0	C; 60703 0
22,3030	I; 74545 0	C; 02163 1	C; 01323 1	I; 77776 1	00006 1	33717 0	52006 0	04141 1
22,3040	C; 00034 0	C; 00002 0	05567 0	06112 0	I; 77775 1	C; 02357 1	C; 36233 0	C; 60703 0
22,3050	I; 77776 1	04161 0	C; 04022 0	03531 0	00006 1	33715 1	52006 0	I; 77775 1
22,3060	I; 77776 1	04755 1	C; 00410 1	06112 0	I; 77650 1	C; 44555 1	04755 1	C; 00411 0
22,3070	06112 0	I; 77650 1	C; 44570 0	54111 1	04755 1	C; 00412 0	13037 1	06112 0
22,3100	I; 77745 1	C; 02163 1	C; 26165 1	C; 02167 0	C; 26175 0	C; 02061 1	C; 24011 1	C; 02067 1
22,3110	C; 24017 1	C; 02211 1	C; 14025 0	C; 05545 0	C; 14007 0	C; 05551 0	I; 77624 1	C; 45255 1
22,3120	I; 77775 1	C; 00033 1	C; 16203 1	C; 05553 1	C; 14007 0	C; 05555 1	I; 77624 1	C; 45255 1
22,3130	I; 77745 1	C; 05557 0	C; 14007 0	C; 05561 0	I; 77624 1	C; 45255 1	I; 77775 1	C; 00011 1
22,3140	C; 26111 1	C; 00017 1	C; 36117 0	C; 45521 0	I; 70251 0	C; 02203 1	C; 05537 0	C; 02133 1
22,3150	I; 77776 1	04161 0	C; 04022 0	06112 0	I; 77745 1	C; 02055 0	C; 26053 0	C; 02111 1
22,3160	C; 26061 1	C; 02117 1	C; 26067 1	C; 02133 1	C; 02211 1	I; 77776 1	31404 0	55403 0
22,3170	03343 0	12210 1	00006 1	31453 1	53455 0	04161 0	C; 04022 0	47743 1
22,3200	55452 1	00006 1	31563 0	52145 0	00006 1	41565 1	20145 0	10144 1
22,3210	13216 0	13213 0	12613 0	30145 1	00006 1	62613 1	11403 0	12614 1
22,3220	00006 1	31451 0	52145 0	00006 1	41447 0	20145 0	37750 1	07375 1
22,3230	00006 1	31563 0	52150 1	00006 1	43543 1	20150 1	07155 1	C; 00147 0
22,3240	00006 1	31565 0	52121 1	00006 1	41563 1	20121 1	05317 1	C; 00352 0
22,3250	10111 1	12612 1	52145 0	53453 0	12615 0	I; 77620 0	C; 02007 1	I; 74352 0
22,3260	C; 02167 0	I; 45006 0	C; 45521 0	I; 45455 1	C; 77736 0	I; 77624 1	C; 45471 1	I; 77650 1
22,3270	C; 02007 1	02140 0	06112 0	I; 77773 1	C; 05564 0	C; 16175 0	C; 02135 1	C; 02177 1
22,3300	I; 40015 1	C; 02151 0	C; 45307 1	C; 26143 0	C; 02175 0	I; 77650 1	C; 45317 0	I; 52034 1
22,3310	C; 73501 1	C; 45303 0	02140 0	06112 0	I; 77773 1	C; 05564 0	C; 02175 0	I; 77645 0
22,3320	C; 02141 1	C; 16203 1	C; 02053 0	C; 02211 1	I; 77776 1	12235 0	06112 0	I; 56345 0
22,3330	C; 02053 0	C; 02211 1	I; 53361 0	C; 02203 1	C; 02175 0	C; 02141 1	I; 77651 0	C; 02133 1
22,3340	C; 02147 1	I; 77650 1	C; 44570 0	00006 1	31307 1	53447 0	00006 1	33541 1
22,3350	21447 0	00002 0	00006 1	22122 0	54107 0	52150 1	33470 1	54131 0
22,3360	54151 0	10150 1	54152 0	37167 0	54153 1	00006 1	30145 1	52117 1
22,3370	50147 0	30005 1	07357 1	05317 1	C; 01206 1	52145 0	52115 0	00006 1

OCTAL LISTING OF PARAGRAPH # 133, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

22,3400	50107 1	30004 0	52145 0	30150 0	54130 1	67763 1	07375 1	00006 1
22,3410	50107 1	30002 0	52145 0	50131 1	52004 1	47762 1	26107 0	47762 1
22,3420	26131 0	10130 1	13404 0	00006 1	30117 0	52145 0	00006 1	30152 1
22,3430	07267 0	00006 1	30117 0	52145 0	52121 1	00006 1	30150 0	07267 0
22,3440	05317 1	C; 00352 0	00006 1	40145 0	20117 1	05317 1	C; 01206 1	00006 1
22,3450	40115 0	20145 0	24153 0	10144 1	13423 0	13457 0	13463 1	10145 0
22,3460	13423 0	13463 1	13463 1	52117 1	52145 0	30153 0	54146 0	00122 0
22,3470	C; 00137 1	I; 77745 1	C; 00007 0	I; 74205 0	C; 05731 1	C; 00025 0	I; 74255 0	C; 00041 1
22,3500	C; 00007 0	I; 53362 0	C; 00017 1	I; 53361 0	C; 00007 0	C; 00011 1	C; 14011 1	C; 00007 0
22,3510	I; 74362 0	C; 00025 0	I; 74255 0	C; 00041 1	C; 00007 0	I; 77655 1	C; 00017 1	C; 00017 1
22,3520	I; 77616 0	I; 57575 1	C; 00011 1	I; 74256 0	C; 21203 0	I; 76541 0	C; 00043 0	C; 00033 1
22,3530	I; 77616 0	30110 1	54156 1	37767 0	54111 1	00002 0	C; 03213 1	C; 00000 1
22,3540	C; 00000 1	C; 06426 1	C; 00513 0	C; 13111 1	C; 00567 0	C; 00000 1	C; 00000 1	C; 01356 0
22,3550	C; 00015 0	C; 14247 0	C; 00226 1	C; 00000 1	C; 00047 1	C; 24767 1	C; 02176 0	C; 00000 1
22,3560	C; 00047 1	C; 27132 1	C; 67637 1	C; 77753 0	C; 42675 0	C; 00000 1	C; 00000 1	C; 02365 0
22,3570	C; 21076 0	C; 14605 1	C; 04744 1	C; 00000 1	C; 00000 1	C; 00415 1	C; 31771 1	C; 77766 0
22,3600	C; 76522 0	C; 00000 1	C; 00000 1	C; 76663 0	C; 67211 1	C; 01513 1	C; 17626 0	C; 01731 0
22,3610	C; 21421 0	C; 75043 1	C; 00007 0	C; 10202 0	C; 00000 1	C; 00000 1	C; 01412 1	C; 02011 0
22,3620	C; 14602 0	C; 07066 0	C; 00000 1	C; 00000 1	C; 00136 0	C; 37231 0	C; 77771 0	C; 45437 0
22,3630	C; 00000 1	C; 00000 1	C; 77241 0	C; 00000 1	C; 01303 0	C; 02015 1	C; 01731 0	C; 21421 0
22,3640	C; 77602 0	C; 00014 1	C; 36766 0	C; 00013 0	C; 03266 0	C; 01372 0	C; 34106 1	C; 73321 0
22,3650	C; 00004 0	C; 15764 0	C; 00000 1	C; 00000 1	C; 00523 0	C; 24403 0	C; 14577 1	C; 26600 0
22,3660	C; 00000 1	C; 00000 1	C; 00000 1	C; 03346 0	C; 77775 1	C; 65065 1	C; 00000 1	C; 00000 1
22,3670	C; 77770 1	C; 43440 0	C; 76346 1	C; 00661 0	C; 01731 0	C; 21421 0	C; 77602 0	C; 00011 1
22,3700	C; 21371 1	C; 00004 0	C; 01370 1	C; 00261 1	C; 13043 1	C; 02000 0	C; 02034 1	C; 44064 0
22,3710	C; 01436 1	C; 00002 0	C; 02035 0	C; 14064 0	C; 02257 0	C; 74064 0	C; 03476 1	C; 60065 1
22,3720	C; 00010 0	C; 00000 1	C; 00000 1	C; 77777 0	C; 77777 0	C; 00000 1	C; 00000 1	C; 00310 0
22,3730	C; 12525 0	C; 12525 0	C; 14000 1	C; 22000 1	C; 25252 0	C; 25253 1	C; 30000 1	C; 31103 1
22,3740	C; 36652 0	C; 00021 1	C; 03742 0	C; 03743 1	CKSM 47042 1	@	@	@
22,3750	@	@	@	@	@	@	@	@
22,3760	@	@	@	@	@	@	@	@
22,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 134, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

23,2000	52142 1	50273 1	32052 1	54136 1	50273 1	32152 0	54137 0	40273 0
23,2010	62036 0	00006 1	62016 1	37763 1	54130 1	02034 1	37762 0	54130 1
23,2020	50273 1	32420 0	54143 0	35537 0	70136 1	54002 1	50000 1	32406 1
23,2030	54140 0	00006 1	50002 0	32410 0	52142 1	52006 0	C; 00055 1	52114 1
23,2040	00006 1	50000 1	32331 1	52114 1	52006 0	52114 1	00006 1	50000 1
23,2050	32253 1	12043 0	C; 00000 1	C; 40000 0	C; 40000 0	C; 40000 0	C; 40000 0	C; 40000 0
23,2060	C; 40000 0	C; 00000 1	C; 77776 1	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1	C; 77777 0
23,2070	C; 00024 1	C; 00024 1	C; 00032 0	C; 00037 0	C; 00400 0	C; 00342 1	C; 00337 0	C; 00337 0
23,2100	C; 00337 0	C; 01355 0	C; 00337 0	C; 01363 0	C; 02166 1	C; 02046 1	C; 02174 1	C; 00337 0
23,2110	C; 01500 0	C; 01503 0	C; 00035 1	C; 00422 0	C; 00342 1	C; 00374 1	C; 00357 0	C; 03031 0
23,2120	C; 00000 1	C; 00000 1	C; 01360 0	C; 00000 1	C; 01444 1	C; 01447 1	C; 01452 0	C; 02000 0
23,2130	C; 02002 1	C; 02004 1	C; 02006 0	C; 02010 1	C; 04012 0	C; 04015 1	C; 04020 1	C; 02023 1
23,2140	C; 04025 1	C; 04030 0	C; 02033 0	C; 02035 0	C; 04037 1	C; 04042 0	C; 04045 1	C; 04050 0
23,2150	C; 04053 0	C; 04056 0	C; 00000 1	C; 00040 0	C; 00140 1	C; 00102 1	C; 00241 0	C; 00200 0
23,2160	C; 00343 0	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1
23,2170	C; 00200 0	C; 00241 0	C; 04102 0	C; 04140 0	C; 04102 0	C; 04102 0	C; 00200 0	C; 00140 1
23,2200	C; 04000 0	C; 00140 1	C; 04140 0	C; 04000 0	C; 00252 1	C; 00252 1	C; 00350 1	C; 04000 0
23,2210	C; 04000 0	C; 04000 0	C; 02102 0	C; 02102 0	C; 02102 0	C; 00140 1	C; 02161 0	C; 04162 0
23,2220	C; 00000 1	C; 00000 1	C; 04000 0	C; 00000 1	C; 04144 1	C; 04145 0	C; 04145 0	C; 00016 0
23,2230	C; 00023 0	C; 00024 1	C; 00025 0	C; 00542 1	C; 04114 1	C; 04115 0	C; 40757 0	C; 00001 0
23,2240	C; 00000 1	C; 06143 1	C; 00126 1	C; 00126 1	C; 20410 0	C; 22451 1	C; 00412 0	C; 20450 1
23,2250	C; 20410 0	C; 22451 1	C; 00006 1	C; 03240 1	C; 00253 0	C; 25124 1	C; 00000 1	C; 00000 1
23,2260	C; 10707 0	C; 03435 0	C; 00001 0	C; 02133 1	C; 00011 1	C; 30322 1	C; 00004 0	C; 14021 1
23,2270	C; 00314 1	C; 31463 1	C; 23420 0	C; 00000 1	C; 00201 1	C; 30327 1	C; 01371 0	C; 34750 1
23,2300	C; 00001 0	C; 03434 1	C; 00006 1	C; 20162 0	C; 00011 1	C; 27066 1	C; 00005 1	C; 24733 0
23,2310	C; 00002 0	C; 23224 1	C; 00014 1	C; 06500 1	C; 00012 1	C; 36455 0	C; 04256 1	C; 07071 0
23,2320	C; 00011 1	C; 17410 1	C; 00004 0	C; 33740 1	C; 00007 0	C; 03701 1	C; 00005 1	C; 21616 0
23,2330	C; 05174 0	C; 13261 0	C; 27670 0	C; 31357 1	C; 00000 1	C; 00000 1	C; 00714 0	C; 31463 1
23,2340	C; 35753 0	C; 32323 1	C; 03216 1	C; 06400 0	C; 07237 0	C; 37776 0	C; 00120 1	C; 00000 1
23,2350	C; 00321 1	C; 26706 1	C; 37441 1	C; 14447 0	C; 05300 1	C; 20305 0	C; 34631 1	C; 23146 0
23,2360	C; 04725 0	C; 35454 1	C; 03225 1	C; 07470 0	C; 05521 1	C; 30260 0	C; 14226 1	C; 31757 0
23,2370	C; 02476 0	C; 05531 0	C; 02727 1	C; 16415 0	C; 00007 0	C; 13734 0	C; 03477 0	C; 14165 0

OCTAL LISTING OF PARAGRAPH # 135, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "1" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

23,2400	C; 06442 0	C; 04735 1	C; 04374 0	C; 30251 1	C; 05605 1	C; 03656 1	C; 03471 0	C; 03475 1
23,2410	C; 03447 0	C; 03453 0	C; 03455 0	C; 03461 1	C; 03463 0	C; 03467 1	C; 00337 0	C; 00340 0
23,2420	C; 03447 0	C; 03451 1	C; 03452 1	C; 03455 0	C; 03457 1	C; 03460 0	C; 00351 0	C; 00354 0
23,2430	C; 00353 1	C; 00013 0	C; 00013 0	C; 00342 1	C; 00343 0	C; 00344 1	C; 00403 0	C; 00405 0
23,2440	C; 00407 1	C; 01475 0	C; 01475 0	C; 01475 0	C; 01475 0	C; 02052 1	C; 02054 1	C; 02056 0
23,2450	C; 02060 0	C; 02062 1	C; 02064 1	C; 02166 1	C; 02174 1	C; 02200 1	C; 00337 0	C; 00341 1
23,2460	C; 02176 0	C; 00337 0	C; 00341 1	C; 00343 0	C; 00337 0	C; 00341 1	C; 00343 0	C; 00000 1
23,2470	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1	C; 00204 1	C; 00204 1	C; 00204 1
23,2500	C; 00204 1	C; 00142 0	C; 04104 0	C; 04104 0	C; 06204 1	C; 00205 0	C; 06043 0	C; 16347 0
23,2510	C; 00104 1	C; 00104 1	C; 16347 0	C; 12245 1	C; 06345 0	C; 16247 1	C; 16347 0	C; 12245 1
23,2520	00006 1	23546 1	11614 1	37753 1	02526 1	02530 0	00006 1	05014 1
23,2530	37743 0	54047 0	11616 0	02537 1	04736 1	02547 0	02543 1	32553 0
23,2540	00006 1	05014 1	01546 1	32554 1	00006 1	05014 1	01546 1	32555 0
23,2550	00006 1	05014 1	01546 1	C; 01100 1	C; 01200 1	C; 01300 0	37767 0	55563 1
23,2560	55550 1	03151 1	03175 1	03255 0	03161 1	03175 1	03151 1	37767 0
23,2570	03103 0	33332 0	03103 0	03271 0	33334 0	03103 0	33335 1	03103 0
23,2600	37767 0	03105 0	03271 0	33340 0	54400 1	54401 0	33333 1	03105 0
23,2610	33341 1	03103 0	37767 0	03103 0	37762 0	55672 1	33342 1	51672 0
23,2620	54400 1	05206 0	C; 26065 0	33336 1	03024 1	33337 0	03024 1	03047 1
23,2630	05206 0	C; 26751 0	12767 1	03255 0	11672 1	12615 0	43332 1	03103 0
23,2640	03271 0	43335 0	54400 1	54401 0	43333 0	03105 0	37767 0	03105 0
23,2650	03271 0	03255 0	03216 1	03216 1	43346 1	00006 1	03012 1	37761 0
23,2660	05663 1	C; 02665 0	C; 46065 0	33356 1	05545 0	33356 1	05551 0	05727 0
23,2670	46306 0	61563 0	00006 1	62675 1	12716 1	51563 0	32771 1	54400 1
23,2700	54401 0	54402 0	37756 1	00006 1	05012 1	00004 0	37762 0	05663 1
23,2710	C; 02612 0	C; 22065 1	00003 1	03175 1	25563 0	12654 0	03255 0	37767 0
23,2720	55563 1	05206 0	C; 20250 1	05206 0	C; 26745 0	12767 1	51563 0	33000 1
23,2730	54423 0	54422 1	05206 0	C; 20364 1	05206 0	C; 26745 0	12767 1	03170 1
23,2740	25563 0	47761 1	61563 0	00006 1	62726 0	37767 0	55563 1	54353 0
23,2750	54351 1	54352 1	47763 0	54350 0	51563 0	33005 1	54357 1	54360 0
23,2760	03170 1	25563 0	47757 1	67762 0	61563 0	00006 1	62754 0	05206 0
23,2770	C; 30770 1	C; 03013 0	C; 02660 0	C; 01042 0	C; 00000 1	C; 76736 1	C; 75120 0	C; 74765 0

OCTAL LISTING OF PARAGRAPH # 136, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

23,3000	C; 01463 1	C; 01042 0	C; 00000 1	C; 76736 1	C; 76315 1	C; 00000 1	C; 00001 0	C; 00002 0
23,3010	C; 00004 0	C; 00010 0	C; 00020 0	C; 00040 0	C; 00100 0	C; 00200 0	C; 00237 1	C; 00400 0
23,3020	C; 00545 0	C; 00544 1	C; 77540 0	C; 77232 1	00006 1	23546 1	55577 1	10067 1
23,3030	05532 0	41577 1	51672 0	60032 0	00006 1	63027 1	51672 0	30032 0
23,3040	57575 1	57576 1	05026 0	53573 0	53571 1	00003 1	01546 1	00006 1
23,3050	23546 1	53576 0	00006 1	20001 1	55677 1	06112 0	I; 45345 1	C; 02573 1
23,3060	C; 02571 0	I; 67206 1	C; 02700 1	I; 56261 1	C; 20617 0	I; 47005 1	C; 07362 1	C; 33520 0
23,3070	C; 00343 0	I; 77776 1	33353 1	04657 1	04622 0	04475 0	12767 1	13101 0
23,3100	13072 0	25550 0	01546 1	54400 1	54401 0	54402 0	00006 1	23546 1
23,3110	37765 1	55551 0	05206 0	C; 26065 0	05206 0	C; 26751 0	12767 1	11551 0
23,3120	03111 0	03175 1	01546 1	00006 1	23546 1	05206 0	C; 26252 0	05206 0
23,3130	C; 26751 0	12767 1	01546 1	00006 1	23546 1	33344 1	54146 0	33347 1
23,3140	04657 1	04622 0	04475 0	12767 1	13146 0	13135 1	04626 1	25550 0
23,3150	01546 1	00006 1	23546 1	05206 0	C; 26000 0	05206 0	C; 26751 0	12767 1
23,3160	01546 1	43346 1	00006 1	03012 1	37757 0	00006 1	05012 1	00002 0
23,3170	00006 1	23545 1	25550 0	33352 0	13201 0	00006 1	23545 1	25550 0
23,3200	33351 0	04657 1	33354 0	04657 1	31550 0	73343 1	04657 1	04622 0
23,3210	04475 0	12767 1	13214 1	13200 1	04626 1	01545 1	00006 1	23545 1
23,3220	05206 0	C; 26000 0	37762 0	55512 1	37761 0	55544 1	00004 0	47152 1
23,3230	70074 0	67752 0	54074 0	00003 1	05206 0	C; 31003 0	04644 0	03161 1
23,3240	00004 0	37751 0	05663 1	C; 03247 0	C; 46065 0	33355 1	05545 0	33355 1
23,3250	05551 0	05727 0	03133 0	03151 1	01545 1	37767 0	54400 1	54401 0
23,3260	54402 0	00006 1	23546 1	05206 0	C; 26065 0	05206 0	C; 26751 0	12767 1
23,3270	01546 1	00006 1	23545 1	03123 1	30032 0	55575 0	30033 1	55576 0
23,3300	30034 0	55577 1	03151 1	31575 1	00006 1	20032 1	54337 1	31576 1
23,3310	00006 1	20033 0	54340 1	31577 0	00006 1	20034 1	54341 0	33350 1
23,3320	04657 1	04622 0	04475 0	12767 1	13326 1	13317 0	25550 0	01545 1
23,3330	C; 00133 0	C; 06000 1	C; 10000 0	C; 14477 0	C; 20000 0	C; 30000 1	C; 01616 1	C; 34344 0
23,3340	C; 40000 0	C; 50000 1	C; 36162 1	C; 00077 1	C; 00030 1	C; 00454 1	C; 00050 1	C; 00110 1
23,3350	C; 00530 1	C; 00620 0	C; 00640 0	C; 00666 1	C; 03300 1	C; 47252 1	C; 46670 1	C; 47303 1
23,3360	C; 02500 0	C; 00043 0	C; 05000 1	C; 03363 1	C; 03364 0	CKSM 62700 1	@	@
23,3370	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 140, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

24,2000	37767 0	55576 0	55742 0	33714 0	55744 0	06112 0	I; 77624 1	C; 30553 1
24,2010	I; 77776 1	37763 1	55544 1	54344 0	37763 1	54400 1	54401 0	54402 0
24,2020	05206 0	C; 26000 0	05206 0	C; 26751 0	12250 0	37767 0	54343 1	55537 0
24,2030	55574 1	55575 0	33644 1	54342 0	05206 0	C; 26065 0	11742 0	02042 0
24,2040	03576 0	03605 1	05206 0	C; 26751 0	02250 1	03353 1	03104 1	02113 0
24,2050	03133 0	05206 0	C; 26751 0	12250 0	11742 0	02076 1	06112 0	I; 71545 0
24,2060	C; 02511 0	I; 72476 1	C; 16573 1	C; 02511 0	I; 72556 1	C; 26571 0	C; 11716 1	C; 26721 1
24,2070	C; 11724 0	C; 26727 1	C; 11732 1	C; 02735 1	I; 77776 1	02077 0	04724 1	03621 1
24,2100	05206 0	C; 72014 1	04161 0	C; 00005 1	37767 0	54342 0	31640 1	54343 1
24,2110	51544 0	55551 0	03605 1	51537 1	02115 0	05206 0	C; 30424 0	33647 1
24,2120	55632 0	37752 0	55527 1	37763 1	55673 0	37767 0	51541 0	54037 1
24,2130	55626 0	33661 0	03214 0	00004 0	02776 0	00003 1	03072 1	37766 1
24,2140	55673 0	51537 1	02143 0	05206 0	C; 30424 0	11676 0	03436 0	11627 1
24,2150	02154 0	04736 1	41632 0	55632 0	00006 1	41627 1	21633 1	06112 0
24,2160	I; 45345 1	C; 02635 0	C; 02631 1	I; 56325 0	C; 02633 0	I; 41325 0	C; 11651 0	I; 77634 0
24,2170	C; 33520 0	C; 00343 0	I; 77776 1	03605 1	33642 1	55527 1	05206 0	C; 30424 0
24,2200	30032 0	55530 1	51544 0	41550 1	55576 0	03621 1	37767 0	55400 0
24,2210	55401 1	55404 1	55405 0	55406 0	55407 1	55412 0	55413 1	55414 0
24,2220	55415 1	55420 1	55421 0	37743 0	55574 1	55575 0	05206 0	C; 72014 1
24,2230	04161 0	C; 00005 1	31636 0	54343 1	30032 0	55531 0	37767 0	54342 0
24,2240	03605 1	37763 1	61544 0	54344 0	37762 0	55546 0	05206 0	C; 22342 1
24,2250	05206 0	C; 30770 1	33652 0	00006 1	02030 0	10000 0	02444 1	33645 0
24,2260	04657 1	04724 1	05206 0	C; 26000 0	05206 0	C; 26751 0	12250 0	37754 0
24,2270	55777 0	33655 1	03245 1	03353 1	03104 1	12252 1	03133 0	05206 0
24,2300	C; 26751 0	12250 0	37762 0	55672 1	51672 0	40400 1	51672 0	60032 0
24,2310	55551 0	11551 0	02320 1	02315 1	02320 1	11672 1	02303 0	02324 0
24,2320	73660 0	10000 0	02444 1	02315 1	37763 1	55673 0	47763 0	55670 0
24,2330	37767 0	54037 1	54040 1	54041 0	37751 0	55527 1	37763 1	03214 0
24,2340	11676 0	03236 0	33661 0	03214 0	37762 0	55541 1	00004 0	02776 0
24,2350	00003 1	37767 0	51541 0	54037 1	03072 1	57673 1	67761 0	55673 0
24,2360	11541 1	02345 1	47761 1	61673 1	55673 0	22007 0	51673 1	31626 1
24,2370	22000 1	51673 1	21572 1	31673 1	71670 0	10000 0	02362 1	34570 1

OCTAL LISTING OF PARAGRAPH # 141, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

24,2400	66311 1	55673 0	40000 0	55670 0	11676 0	03236 0	03457 1	33646 0
24,2410	04657 1	04622 0	04475 0	02250 1	02415 0	37767 0	54423 0	33662 0
24,2420	54422 1	05206 0	C; 20250 1	05206 0	C; 26745 0	02250 1	05206 0	C; 20364 1
24,2430	05206 0	C; 26745 0	02444 1	04622 0	04475 0	02250 1	02437 0	37767 0
24,2440	54422 1	43662 1	54423 0	02421 1	56002 0	55546 0	04755 1	C; 01411 1
24,2450	01546 1	06112 0	I; 77624 1	C; 30553 1	I; 77776 1	33635 1	04657 1	04475 0
24,2460	12250 0	02455 1	56337 0	55614 1	00006 1	62472 1	75340 1	00006 1
24,2470	12474 0	02455 1	40000 0	02466 1	31614 0	67761 0	50000 1	02500 0
24,2500	02455 1	02507 1	02506 0	02505 0	02500 0	02510 1	02514 0	02517 0
24,2510	37761 0	55544 1	02521 0	02521 0	37762 0	55544 1	02521 0	37763 1
24,2520	55544 1	55617 1	55621 1	04724 1	37767 0	55536 1	55622 1	55563 1
24,2530	55615 0	33637 0	55623 0	05206 0	C; 26000 0	05206 0	C; 26751 0	12250 0
24,2540	03353 1	03104 1	12250 0	03133 0	05206 0	C; 31726 0	55552 0	37756 1
24,2550	02563 0	37756 1	00006 1	05014 1	00004 0	47762 1	70366 0	67762 0
24,2560	54366 0	37762 0	55552 0	55527 1	37763 1	03214 0	11676 0	03236 0
24,2570	05206 0	C; 46520 1	11552 0	02546 1	11615 0	02656 0	11621 1	02616 1
24,2600	02622 0	37767 0	54356 0	05206 0	C; 30424 0	37763 1	54356 0	55622 1
24,2610	21563 1	41563 1	77766 0	00006 1	12765 0	02570 1	37767 0	55621 1
24,2620	51672 0	54032 1	00004 0	37757 0	55624 1	51672 0	10032 1	02641 0
24,2630	02633 0	02444 1	02652 1	11624 1	02624 0	00003 1	10067 1	05532 0
24,2640	02622 0	43636 0	51672 0	54032 1	37763 1	55615 0	30047 1	55620 0
24,2650	00003 1	02656 0	33636 1	51672 0	54032 1	02644 0	51672 0	10032 1
24,2660	02664 1	02701 0	02664 1	02701 0	37752 0	00006 1	02014 0	10000 0
24,2670	02676 1	11622 1	02674 0	02601 1	55622 1	02570 1	10067 1	05532 0
24,2700	02656 0	00004 0	37767 0	54356 0	67770 0	56047 1	55621 1	47762 1
24,2710	70366 0	54366 0	00003 1	31620 1	00006 1	61621 0	55622 1	00006 1
24,2720	62737 0	73640 1	00006 1	12731 1	41622 1	73640 1	00006 1	12733 0
24,2730	02765 1	31622 0	02737 0	37743 0	00006 1	61622 0	02740 0	40000 0
24,2740	22007 0	00006 1	11623 0	54342 0	02745 0	04632 1	04637 1	31614 0
24,2750	54344 0	33643 0	04657 1	04622 0	04475 0	02757 0	02455 1	05206 0
24,2760	C; 26000 0	05206 0	C; 26751 0	12250 0	12250 0	05206 0	C; 26000 0	05206 0
24,2770	C; 26751 0	12250 0	37767 0	54356 0	02444 1	12250 0	00006 1	23546 1

OCTAL LISTING OF PARAGRAPH # 142, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
24,3000    00003 1    10067 1    05532 0    00004 0    37767 0    51541 0    56037 0    55551 0
24,3010    11551 0    03015 0    03070 0    03030 1    03070 0    37756 1    55540 0    51541 0
24,3020    10037 1    03043 0    03025 0    03070 0    03025 0    11540 0    03016 0    03070 0
24,3030    37756 1    55540 0    51541 0    10037 1    03070 0    03040 0    03043 0    03040 0

24,3040    11540 0    03031 0    03070 0    05026 0    52145 0    37760 1    55540 0    51541 0
24,3050    10037 1    03055 1    03070 0    03055 1    03070 0    11540 0    03046 0    03062 0
24,3060    55551 0    01546 1    57551 1    51541 0    60037 0    51541 0    54037 1    00002 0
24,3070    03062 0    03000 1    31551 1    51673 1    55626 0    30144 0    51673 1    55627 1

24,3100    30145 1    51673 1    55630 1    00002 0    00006 1    23546 1    06112 0    I; 77624 1
24,3110    C; 32655 0    I; 77776 1    05206 0    C; 26065 0    30075 0    77754 1    10000 0    03122 0
24,3120    23546 1    03124 0    37762 0    55551 0    06067 0    C; 00200 0    05206 0    C; 26751 0
24,3130    12250 0    01546 1    C; 00401 1    00006 1    23546 1    05206 0    C; 26000 0    05206 0

24,3140    C; 26751 0    12250 0    05206 0    C; 26252 0    05206 0    C; 26751 0    12250 0    30032 0
24,3150    50110 1    54024 0    30033 1    50110 1    54020 1    30034 0    50110 1    54022 0
24,3160    37757 0    50110 1    50110 1    54050 0    06112 0    I; 64375 1    C; 02401 0    C; 02445 0
24,3170    I; 77772 0    C; 34041 0    C; 32555 0    C; 26423 0    C; 02407 0    I; 76521 0    C; 02445 0    C; 34041 0

24,3200    C; 32555 0    C; 26431 0    C; 02423 0    I; 76435 1    C; 02431 0    C; 36437 1    C; 32425 0    I; 77776 1
24,3210    33651 0    05206 0    C; 26362 1    01546 1    00006 1    23545 1    55676 0    11676 0
24,3220    03224 0    01545 1    03224 0    03216 1    00004 0    31527 0    05663 1    C; 03242 0
24,3230    C; 50065 1    00003 1    11676 0    01545 1    01545 1    13236 1    55676 0    33241 0

24,3240    05545 0    C; 51217 1    33241 0    05551 0    05727 0    54001 1    13250 1    55777 0
24,3250    37767 0    50001 0    54000 0    24001 0    11777 0    13247 1    00002 0    06112 0
24,3260    I; 77170 1    C; 00026 0    C; 00012 1    I; 77731 1    C; 00051 0    C; 00004 0    I; 77731 1    C; 00052 0
24,3270    C; 00004 0    I; 44743 1    C; 75120 0    C; 02657 1    I; 41323 0    C; 75156 1    C; 11651 0    I; 77671 1

24,3300    I; 55504 0    C; 51306 0    I; 47046 0    C; 33520 0    C; 34343 1    C; 51310 1    I; 60006 1    C; 51271 1
24,3310    I; 77776 1    04644 0    03605 1    06112 0    I; 41535 1    C; 02630 0    I; 41535 1    C; 02634 1
24,3320    I; 55535 1    C; 02640 1    I; 76456 1    I; 77606 1    I; 41535 1    C; 02644 0    I; 41535 1    C; 02650 0
24,3330    I; 55535 1    C; 02654 1    I; 76456 1    I; 45325 1    C; 02655 0    C; 02641 0    I; 77612 1    I; 77652 0

24,3340    C; 26530 0    I; 51435 1    I; 56205 0    C; 11654 0    C; 02530 0    I; 77634 0    C; 33520 0    C; 00343 0
24,3350    I; 77776 1    03605 1    12407 1    00006 1    23546 1    06112 0    I; 54160 1    C; 51670 1
24,3360    C; 02536 0    I; 77773 1    C; 00001 0    C; 02445 0    I; 54160 1    C; 51702 0    C; 02536 0    I; 77773 1
24,3370    C; 00001 0    C; 16453 1    C; 33300 1    C; 14007 0    C; 02507 1    I; 57546 1    C; 14011 1    C; 02507 1
```

OCTAL LISTING OF PARAGRAPH # 143, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

24,3400	I: 77756 0	C: 00013 0	I: 77775 1	C: 11703 0	C: 34015 1	C: 32741 1	I: 77776 1	33647 1
24,3410	55777 0	33667 0	03245 1	51544 0	03415 1	03533 1	03431 1	03440 1
24,3420	03445 1	03457 1	03467 1	03477 0	03507 0	03522 1	03551 0	03562 0
24,3430	03573 0	37746 0	55400 0	55410 1	55420 1	37767 0	55541 1	01546 1
24,3440	47746 1	55400 0	55412 0	55416 1	03435 0	37746 0	55414 0	40000 0
24,3450	55402 1	55412 0	37762 0	55541 1	37767 0	55576 0	01546 1	37746 0
24,3460	55404 1	55410 1	40000 0	55414 0	37762 0	55541 1	01546 1	37746 0
24,3470	55406 0	40000 0	55404 1	55416 1	37763 1	55541 1	03454 1	37746 0
24,3500	55402 1	55420 1	40000 0	55406 0	37763 1	55541 1	01546 1	47746 1
24,3510	55402 1	33663 1	55406 0	55414 0	55420 1	40000 0	55412 0	06067 0
24,3520	C: 00200 0	03454 1	37746 0	55404 1	33663 1	55406 0	55416 1	55414 0
24,3530	40000 0	55410 1	03454 1	33664 0	55400 0	55410 1	55412 0	55414 0
24,3540	33663 1	55406 0	33666 1	55402 1	55420 1	43665 0	55404 1	55416 1
24,3550	01546 1	37746 0	55416 1	33663 1	55400 0	55404 1	55406 0	40000 0
24,3560	55412 0	03454 1	37746 0	55420 1	33663 1	55400 0	55406 0	55410 1
24,3570	40000 0	55402 1	03454 1	05206 0	C: 73044 0	01546 1	30342 1	55527 1
24,3600	30343 0	55536 1	30344 1	55544 1	00002 0	00006 1	23546 1	31544 0
24,3610	54344 0	33643 0	04657 1	04622 0	04475 0	02241 1	01546 1	03576 0
24,3620	13607 1	00006 1	23546 1	06112 0	I: 77775 1	C: 02401 0	C: 26750 1	C: 02407 0
24,3630	C: 26756 1	C: 02415 0	C: 02764 0	I: 77776 1	01546 1	C: 02130 1	C: 04000 0	C: 04143 0
24,3640	C: 34000 0	C: 00264 1	C: 07626 1	C: 00666 1	C: 01130 1	C: 01620 1	C: 01640 1	C: 00021 1
24,3650	C: 06200 0	C: 00000 1	C: 00400 0	C: 00024 1	C: 35474 0	C: 01506 0	C: 02521 0	C: 02500 0
24,3660	C: 77760 0	C: 00070 0	C: 10000 0	C: 13241 1	C: 10000 0	C: 15520 1	C: 02260 1	C: 01400 1
24,3670	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 20000 0	C: 00000 1	C: 00000 1	C: 00000 1
24,3700	C: 00000 1	C: 00000 1	C: 20000 0	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1	C: 00000 1
24,3710	C: 00000 1	C: 00000 1	C: 57777 1	C: 77777 0	C: 00144 0	C: 17127 0	C: 16705 1	C: 07314 0
24,3720	C: 36223 1	C: 04521 0	C: 31140 0	C: 75755 1	C: 73521 0	C: 72476 1	C: 54176 0	C: 04771 1
24,3730	C: 03365 1	C: 75644 0	C: 70661 1	C: 47762 1	C: 75077 0	C: 70023 1	C: 73740 0	05235 0
24,3740	55547 1	02776 0	31547 0	05230 0	C: 03744 0	C: 03745 1	CKSM 46420 0	@
24,3750	@	@	@	@	@	@	@	@
24,3760	@	@	@	@	@	@	@	@
24,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 144, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
25,2000      04117 1   C; 00071 1      36311 I      54764 0      04161 0   C; 47012 1   C; 00001 0   C; 02021 0
25,2010   C; 52064 1      37761 0      04105 1      00004 0      37763 1      05663 1   C; 02021 0   C; 52064 1
25,2020      15567 1      37767 0      00006 1      01006 0      00006 1      01005 0      04161 0   C; 47012 1
25,2030   C; 00144 0   C; 02035 0   C; 52064 1      05701 1   C; 00144 0      05073 0   C; 00274 0   C; 00276 1

25,2040   C; 00144 0      05101 1   C; 00004 0   C; 00144 0      05073 0   C; 00275 1   C; 00277 0   C; 00144 0
25,2050      05101 1   C; 00006 1   C; 00144 0      05101 1   C; 00005 1   C; 00144 0      05101 1   C; 00007 0
25,2060   C; 00620 0      40075 1      77747 0      10000 0      12070 0      05701 1   C; 00062 0      12061 0
25,2070      04161 0   C; 05012 1   C; 77777 0      06067 0   C; 20000 0      33014 1      00006 1      01005 0

25,2100      05270 1   C; 40062 1      05101 1   C; 00072 1   C; 00062 0      40077 0      77751 1      26077 0
25,2110      05270 1   C; 40054 1      04161 0   C; 47012 1   C; 00062 0   C; 02121 1   C; 52064 1      05701 1
25,2120   C; 00062 0      05270 1   C; 40072 0      05073 0   C; 00132 1   C; 00004 0   C; 00012 1      05270 1
25,2130   C; 40046 1      40075 1      77760 0      26075 1      04161 0   C; 47012 1   C; 00132 1   C; 02143 0

25,2140   C; 52064 1      05701 1   C; 00132 1      05270 1   C; 40277 1      05073 0   C; 00073 0   C; 00226 1
25,2150   C; 00001 0      37752 0      05663 1   C; 02436 1   C; 52064 1      04141 1   C; 40072 0   C; 47016 0
25,2160   C; 01000 0   C; 02436 1   C; 52064 1      05270 1   C; 40046 1      05101 1   C; 00126 1   C; 00144 0
25,2170      05101 1   C; 00133 0   C; 01130 1      05270 1   C; 40114 1      04161 0   C; 47012 1   C; 00620 0

25,2200   C; 02204 0   C; 52065 0      05701 1   C; 00620 0      35661 0      54003 0      05101 1   C; 00010 0
25,2210   C; 00144 0      05270 1   C; 40226 0      04161 0   C; 47012 1   C; 00144 0   C; 02222 1   C; 52065 0
25,2220      05701 1   C; 00144 0      05073 0   C; 00005 1   C; 00011 1   C; 00620 0      37767 0      55341 1
25,2230      37763 1      55511 1      05270 1   C; 40263 1      04161 0   C; 47012 1   C; 00764 1   C; 02243 0

25,2240   C; 52065 0      05701 1   C; 00764 1      05270 1   C; 40226 0      04161 0   C; 47012 1   C; 00310 0
25,2250   C; 02254 0   C; 52065 0      05701 1   C; 00310 0      05270 1   C; 40066 0      04161 0   C; 47012 1
25,2260   C; 03554 0   C; 02265 1   C; 52065 0      05701 1   C; 03554 0      05101 1   C; 00336 1   C; 00310 0
25,2270      05101 1   C; 00337 0   C; 00454 1      35210 1      05516 0   C; 02464 0   C; 52065 0      04141 1

25,2300   C; 40112 1   C; 07024 0   C; 30000 I   C; 02464 0   C; 52065 0      05701 1   C; 00620 0      05101 1
25,2310   C; 00046 0   C; 00144 0      05101 1   C; 00026 0   C; 00001 0      04161 0   C; 00002 0      15727 1
25,2320      35662 0      54003 0      00006 1      31777 1      53321 1      05270 1   C; 40175 0      37751 0
25,2330      54003 0      04161 0   C; 47012 1   C; 00144 0   C; 02340 1   C; 52064 1      05701 1   C; 00144 0

25,2340      05101 1   C; 00227 0   C; 00620 0      05270 1   C; 40263 1      04161 0   C; 47012 1   C; 00144 0
25,2350   C; 02354 1   C; 52064 1      05701 1   C; 00144 0      05073 0   C; 00047 1   C; 00206 0   C; 05214 0
25,2360      05270 1   C; 40062 1      04161 0   C; 47012 1   C; 00310 0   C; 02371 0   C; 52064 1      05701 1
25,2370   C; 00310 0      05270 1   C; 40175 0      04161 0   C; 47012 1   C; 00310 0   C; 02402 0   C; 52064 1
```

OCTAL LISTING OF PARAGRAPH # 145, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
25,2400     05701 1   C; 00310 0     05270 1   C; 40066 0     04161 0   C; 47012 1   C; 13250 1   C; 02413 0
25,2410 C; 52064 1       05701 1   C; 13250 1     05270 1   C; 40263 1     04161 0   C; 47012 1   C; 00144 0
25,2420 C; 02424 1   C; 52064 1     05701 1   C; 00144 0     05101 1   C; 00207 1   C; 05524 1     06067 0
25,2430 C; 00001 0     05270 1   C; 40054 1     04161 0   C; 00002 0     05727 0       37762 0     00006 1

25,2440     02030 0     00006 1     12446 1     05701 1   C; 00062 0     12436 0       04141 1   C; 00004 0
25,2450 C; 47012 1   C; 77777 0   C; 02320 1   C; 52064 1     04141 1   C; 00006 1   C; 00003 1     35660 1
25,2460     05505 1   C; 02354 1   C; 02063 0     15727 1     37743 0     55323 0       00006 1     32473 0
25,2470     52006 0     15567 1   C; 03466 0   C; 60065 1     04141 1   C; 00006 1   C; 05022 1   C; 20000 0

25,2500     04141 1   C; 00003 1   C; 00004 0     37755 1     04105 1     04161 0   C; 47013 0   C; 07640 1
25,2510 C; 02555 0   C; 52064 1     04161 0   C; 06022 1   C; 02524 0   C; 52064 1     00004 0     33005 1
25,2520     05663 1   C; 02555 0   C; 52064 1     00003 1     00006 1     30025 0       53567 0     00006 1
25,2530     33007 0     21567 0     00006 1     31567 1     52421 1     04117 1   C; 00014 1     00006 1

25,2540     33011 1     52006 0     04161 0   C; 04022 0     33015 0     55310 0       00006 1     33013 0
25,2550     53073 0     33014 1     00006 1     01005 0     05567 0     04141 1   C; 00003 1   C; 05012 1
25,2560 C; 77777 0       37767 0     00006 1     01005 0     04161 0   C; 47012 1   C; 00620 0   C; 02573 1
25,2570 C; 52064 1     05701 1   C; 00620 0     05073 0   C; 00274 0   C; 00276 1   C; 00144 0     05101 1

25,2600 C; 00004 0   C; 00144 0     05073 0   C; 00275 1   C; 00277 0   C; 01604 1     05101 1   C; 00006 1
25,2610 C; 00310 0     05101 1   C; 00007 0   C; 05360 1     05101 1   C; 00005 1   C; 22434 1     00006 1
25,2620     30421 0     53664 0     00006 1     40025 1     21664 0     04161 0   C; 05012 1   C; 77777 0
25,2630     00006 1     31664 1     52421 1     10421 1     67763 1     12640 0       40000 0     67743 0

25,2640     55662 0     05663 1   C; 03016 0   C; 52064 1     04141 1   C; 40052 1   C; 47014 1   C; 76115 0
25,2650 C; 03016 0   C; 52064 1     05701 1   C; 12574 1     05270 1   C; 40054 1     33014 1     00006 1
25,2660     01005 0     05270 1   C; 40062 1     04161 0   C; 47012 1   C; 00144 0   C; 02672 0   C; 52064 1
25,2670     05701 1   C; 00144 0     05101 1   C; 00212 0   C; 00454 1     05101 1   C; 00072 1   C; 00062 0

25,2700     40077 0     77751 1     26077 0     04161 0   C; 47012 1   C; 00062 0   C; 02712 1   C; 52064 1
25,2710     05701 1   C; 00062 0     05270 1   C; 40072 0     05101 1   C; 00132 1   C; 00012 1     05270 1
25,2720 C; 40046 1       40075 1     77760 0     26075 1     04161 0   C; 47012 1   C; 00132 1   C; 02733 1
25,2730 C; 52064 1     05701 1   C; 00132 1     05101 1   C; 00073 0   C; 00144 0     05101 1   C; 00133 0

25,2740 C; 00454 1     05270 1   C; 40066 0     04161 0   C; 47012 1   C; 00764 1   C; 02752 0   C; 52064 1
25,2750     05701 1   C; 00764 1     05270 1   C; 40062 1     04161 0   C; 47012 1   C; 00764 1   C; 02763 1
25,2760 C; 52064 1     05701 1   C; 00764 1     05270 1   C; 40066 0     06067 0   C; 00001 0     05270 1
25,2770 C; 40114 1     05270 1   C; 40054 1     04141 1   C; 00002 0   C; 05013 0   C; 77777 0     05126 1
```

OCTAL LISTING OF PARAGRAPH # 146, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "1" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

25,3000	C; 00004 0	C; 00010 0	C; 01751 0	15727 1	C; 00310 0	C; 07640 1	C; 00001 0	C; 10024 0
25,3010	C; 02341 0	C; 16064 1	C; 02324 0	C; 60064 0	C; 00252 1	C; 02251 0	04141 1	C; 00004 0
25,3020	C; 00335 1	37763 1	05663 1	C; 02000 0	C; 60065 1	15727 1	C; 03026 0	C; 03027 1
25,3030	CKSM 41063 1	@	@	@	@	@	@	@
25,3040	@	@	@	@	@	@	@	@
25,3050	@	@	@	@	@	@	@	@
25,3060	@	@	@	@	@	@	@	@
25,3070	@	@	@	@	@	@	@	@
25,3100	@	@	@	@	@	@	@	@
25,3110	@	@	@	@	@	@	@	@
25,3120	@	@	@	@	@	@	@	@
25,3130	@	@	@	@	@	@	@	@
25,3140	@	@	@	@	@	@	@	@
25,3150	@	@	@	@	@	@	@	@
25,3160	@	@	@	@	@	@	@	@
25,3170	@	@	@	@	@	@	@	@
25,3200	@	@	@	@	@	@	@	@
25,3210	@	@	@	@	@	@	@	@
25,3220	@	@	@	@	@	@	@	@
25,3230	@	@	@	@	@	@	@	@
25,3240	@	@	@	@	@	@	@	@
25,3250	@	@	@	@	@	@	@	@
25,3260	@	@	@	@	@	@	@	@
25,3270	@	@	@	@	@	@	@	@
25,3300	@	@	@	@	@	@	@	@
25,3310	@	@	@	@	@	@	@	@
25,3320	@	@	@	@	@	@	@	@
25,3330	@	@	@	@	@	@	@	@
25,3340	@	@	@	@	@	@	@	@
25,3350	@	@	@	@	@	@	@	@
25,3360	@	@	@	@	@	@	@	@
25,3370	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 150, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

26,2000	32515 1	54003 0	04133 1	C; 00027 1	02006 0	02513 1	37763 1	55715 1
26,2010	04644 0	30144 0	55721 0	30302 0	55716 1	04161 0	C; 00076 0	04117 1
26,2020	C; 00027 1	41721 0	62362 1	00006 1	12030 1	30145 1	55722 0	02052 1
26,2030	37763 1	62523 1	54146 0	32364 1	04657 1	04475 0	12463 0	02030 0
26,2040	37761 0	55717 0	31677 0	02473 0	02030 0	51677 0	32515 1	55722 0
26,2050	37762 0	55715 1	32523 1	61715 0	54146 0	32364 1	04657 1	04475 0
26,2060	12463 0	02052 1	41715 1	61722 1	00006 1	12070 0	25715 0	02052 1
26,2070	32522 0	54146 0	32353 0	04657 1	04475 0	12463 0	02107 0	31722 1
26,2100	55717 0	31720 0	02473 0	02070 1	31720 0	62523 1	02054 1	04724 1
26,2110	00004 0	40076 1	77756 0	54002 1	47756 0	70076 1	60002 0	54076 1
26,2120	00003 1	41721 0	62362 1	00006 1	62132 0	04133 1	C; 00027 1	02132 0
26,2130	31716 0	04122 1	00004 0	31757 0	70076 1	00006 1	12504 0	42153 0
26,2140	61721 1	50000 1	02143 0	00006 1	31701 0	02301 1	02311 0	02315 1
26,2150	02323 1	02331 1	02341 0	C; 00064 0	02345 1	40076 1	77755 0	00006 1
26,2160	12262 1	04161 0	C; 05026 0	C; 33000 1	00004 0	00006 1	31700 1	53211 0
26,2170	00006 1	31700 1	53241 0	00006 1	31702 0	53213 1	00006 1	31702 0
26,2200	53243 1	00006 1	31704 0	53215 1	00006 1	31704 0	53245 1	00006 1
26,2210	31706 1	53217 0	00006 1	31706 1	53247 0	00006 1	31710 0	53221 0
26,2220	00006 1	31710 0	53251 1	00006 1	31712 1	53223 1	00006 1	31712 1
26,2230	53253 0	00006 1	31714 1	53257 1	37767 0	55224 0	55225 1	55226 1
26,2240	55227 0	55230 0	55231 1	55232 1	55233 0	55234 1	55235 0	55236 0
26,2250	55237 1	55254 1	55255 0	55260 0	55261 1	37746 0	05516 0	C; 02475 0
26,2260	C; 16064 1	12464 1	32524 0	05663 1	C; 02274 1	C; 54064 1	04161 0	C; 47016 0
26,2270	C; 00454 1	C; 02274 1	C; 54064 1	05567 0	35651 0	05505 1	C; 02132 0	C; 54064 1
26,2300	05727 0	53206 0	31677 0	55204 1	35651 0	05516 0	C; 02325 1	C; 62064 1
26,2310	02471 1	31677 0	55204 1	05225 1	C; 62202 0	31677 0	55204 1	31700 1
26,2320	55703 0	05225 1	C; 62153 1	31677 0	55204 1	31700 1	55202 1	05225 1
26,2330	C; 62155 1	31677 0	55204 1	31700 1	55202 1	31701 0	55203 0	05225 1
26,2340	C; 62157 0	31677 0	55204 1	05225 1	C; 62165 1	04161 0	C; 05026 0	C; 33000 1
26,2350	00004 0	51722 1	02352 1	C; 02102 0	02417 1	00006 1	31701 0	53755 0
26,2360	02464 0	02405 1	C; 00075 0	02417 1	C; 02101 0	00006 1	31701 0	53765 0
26,2370	00006 1	31703 1	53767 1	00006 1	31705 1	53771 0	00006 1	31707 0

OCTAL LISTING OF PARAGRAPH # 151, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

26,2400	53773 1	00006 1	31711 1	53775 1	02464 0	00006 1	31701 0	53757 1
26,2410	00006 1	31703 1	53761 1	00006 1	31705 1	53763 0	02464 0	40076 1
26,2420	77755 0	00006 1	12262 1	31700 1	61257 0	55714 0	37767 0	61256 1
26,2430	55713 1	37767 0	54001 1	52025 1	53712 0	37766 1	04246 0	C; 00006 1
26,2440	00004 0	37767 0	54146 0	00006 1	31714 1	53257 1	31700 1	61712 1
26,2450	54001 1	37767 0	61711 1	52145 0	07327 0	52145 0	20025 1	37765 1
26,2460	04246 0	C; 00006 1	02464 0	04124 1	04133 1	C; 00027 1	12471 0	31716 0
26,2470	04122 1	05206 0	C; 62351 1	00006 1	62503 0	40000 0	24000 1	61717 1
26,2500	00006 1	62503 0	24002 0	00002 0	04133 1	C; 00027 1	12511 1	31716 0
26,2510	04122 1	04161 0	C; 00006 1	05206 0	C; 22053 1	C; 02000 0	C; 00003 1	C; 00007 0
26,2520	C; 00013 0	C; 00002 0	C; 02320 1	C; 02276 0	C; 00454 1	55730 0	00006 1	23731 0
26,2530	30021 1	60000 1	55727 0	06013 0	31730 1	00006 1	12570 0	72574 1
26,2540	00006 1	12552 0	72575 0	00006 1	12556 1	31730 1	05417 0	23727 1
26,2550	22021 1	01731 0	37753 1	54002 1	37750 1	12561 0	37751 0	54002 1
26,2560	37747 1	57730 1	00006 1	10002 1	05417 0	00006 1	71730 0	12547 1
26,2570	37754 0	55730 0	30001 0	12564 0	C; 77400 0	C; 76000 0	30072 1	00006 1
26,2600	77755 0	56001 0	24001 0	60000 1	54000 0	12602 0	10001 1	60000 1
26,2610	54073 1	50001 0	37753 1	54072 0	70101 0	10000 0	12637 0	00006 1
26,2620	50073 0	32654 1	23162 0	05064 0	30072 1	26101 0	40102 0	50073 0
26,2630	72673 0	26102 0	40103 1	50073 0	72674 1	26103 1	15733 1	40072 0
26,2640	70101 0	54101 0	50073 0	42673 0	70102 0	54102 0	50073 0	42674 1
26,2650	70103 1	54103 1	15733 1	C; 40250 1	C; 00252 1	C; 40170 0	C; 00172 0	C; 40134 0
26,2660	C; 00136 0	C; 40154 0	C; 00156 0	C; 40156 1	C; 00160 0	C; 40310 1	C; 00312 1	C; 40136 1
26,2670	C; 00140 1	C; 40350 0	C; 00352 0	C; 00040 0	C; 00010 0	C; 00020 0	C; 00020 0	C; 00100 0
26,2700	C; 00004 0	C; 00200 0	C; 00200 0	C; 00010 0	C; 00001 0	C; 00001 0	C; 00002 0	C; 00004 0
26,2710	C; 00040 0	C; 00002 0	C; 00100 0	37762 0	00006 1	02030 0	10000 0	46311 0
26,2720	66306 1	55621 1	37762 0	55620 0	00006 1	27621 1	31320 1	00006 1
26,2730	51621 0	73136 1	51621 0	63145 1	00006 1	71320 0	51621 0	63154 1
26,2740	51620 1	55452 1	11620 0	12723 1	12746 1	13014 0	00006 1	33163 0
26,2750	00006 1	11452 1	55613 0	00006 1	33165 0	00006 1	11453 0	55614 1
26,2760	00006 1	33165 0	00006 1	11454 1	55615 0	61614 0	00006 1	73170 0
26,2770	55616 0	55617 1	33166 0	55451 1	31452 0	22007 0	00006 1	11451 1

OCTAL LISTING OF PARAGRAPH # 152, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

26,3000	60000 1	55440 1	37762 0	00006 1	02030 0	10000 0	13010 1	13132 0
26,3010	47763 0	55620 0	55621 1	12726 1	31451 0	00006 1	77760 0	23450 1
26,3020	33173 1	54144 1	35661 0	22000 1	22003 1	31534 1	22003 1	00006 1
26,3030	71320 0	00006 1	10144 1	00006 1	73174 1	00006 1	71450 0	00004 0
26,3040	52145 0	00006 1	30145 1	00006 1	11454 1	55534 0	00006 1	30145 1
26,3050	00006 1	11453 0	55532 0	00006 1	73167 0	55526 0	00006 1	70000 0
26,3060	55527 1	31534 1	00006 1	73167 0	55530 1	00006 1	70000 0	55531 0
26,3070	00006 1	00012 1	54145 0	37762 0	13076 1	37767 0	54144 1	30145 1
26,3100	50144 0	73125 0	00006 1	13117 1	30145 1	50144 0	73126 0	00006 1
26,3110	13114 1	50144 0	41532 0	13120 0	50144 0	31532 1	13120 0	37767 0
26,3120	50144 0	55533 1	10144 1	13075 1	13131 0	C; 01400 1	C; 00400 0	C; 06000 1
26,3130	C; 02000 0	00003 1	00006 1	33172 0	52005 0	C; 37573 1	C; 77763 0	C; 46570 1
26,3140	C; 46556 0	C; 00051 0	C; 54334 1	C; 54406 1	C; 46353 0	C; 05463 0	C; 26214 1	C; 25021 0
26,3150	C; 05676 0	C; 05006 1	C; 12613 0	C; 06364 0	C; 00012 1	C; 75650 0	C; 76334 1	C; 77740 1
26,3160	C; 00043 0	C; 77446 1	C; 00047 1	C; 31173 0	C; 00053 1	C; 30441 0	C; 23712 1	C; 23146 0
26,3170	C; 13241 1	C; 41440 1	C; 03440 1	C; 00674 1	C; 02215 0	C; 03175 1	C; 03176 1	CKSM 77023 0
26,3200	@	@	@	@	@	@	@	@
26,3210	@	@	@	@	@	@	@	@
26,3220	@	@	@	@	@	@	@	@
26,3230	@	@	@	@	@	@	@	@
26,3240	@	@	@	@	@	@	@	@
26,3250	@	@	@	@	@	@	@	@
26,3260	@	@	@	@	@	@	@	@
26,3270	@	@	@	@	@	@	@	@
26,3300	@	@	@	@	@	@	@	@
26,3310	@	@	@	@	@	@	@	@
26,3320	@	@	@	@	@	@	@	@
26,3330	@	@	@	@	@	@	@	@
26,3340	@	@	@	@	@	@	@	@
26,3350	@	@	@	@	@	@	@	@
26,3360	@	@	@	@	@	@	@	@
26,3370	@	@	@	@	@	@	@	@

OCIAL LISTING OF PARAGRAPH # 154, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
27,2000    06051 0   C: 00002 0   05567 0   35641 1   05516 0   C: 02056 0   C: 56063 1   31742 1
27,2010    05663 1   C: 02223 0   C: 56063 1   04141 1   C: 00375 0   C: 00273 1   04141 1   C: 40132 0
27,2020  C: 00074 1   37762 0   04105 1   35652 0   54765 1   32342 0   55310 0   00006 1
27,2030    32443 0   53073 0   00006 1   32443 0   53075 0   35661 0   54003 0   37751 0

27,2040    54002 1   00006 1   31562 1   53344 1   00006 1   31344 0   00006 1   22003 1
27,2050    53511 1   00006 1   32055 0   52006 0   C: 02011 0   C: 60065 1   06112 0   I: 71331 0
27,2060  C: 00765 0   C: 00002 0   C: 01344 0   C: 01737 0   C: 01312 0   I: 54345 1   C: 01344 0   C: 20617 0
27,2070  I: 47171 0   C: 01754 0   C: 33541 1   C: 00025 0   I: 60335 1   C: 00025 0   C: 00047 1   I: 47005 1

27,2100  C: 16346 1   C: 33520 0   I: 65257 1   C: 20556 0   C: 00026 0   I: 47005 1   C: 16346 1   C: 33520 0
27,2110  I: 43261 0   C: 21206 0   I: 43215 0   C: 01757 0   C: 01763 1   C: 01746 0   I: 77756 0   C: 15271 1
27,2120  C: 01746 0   I: 77746 1   C: 14150 0   C: 01761 0   I: 77756 0   C: 15267 0   C: 01761 0   I: 72546 0
27,2130  C: 00025 0   I: 77605 1   C: 00150 0   C: 15263 1   C: 01271 1   I: 77605 1   C: 00025 0   C: 15265 1

27,2140  C: 17103 0   C: 14152 1   C: 01271 1   I: 47076 0   C: 33516 0   I: 47206 0   C: 01263 1   I: 77656 1
27,2150  C: 15277 1   C: 01752 0   I: 74346 0   C: 01277 1   C: 15277 1   C: 01752 0   I: 74356 1   I: 53451 1
27,2160  C: 01277 1   C: 01277 1   I: 53435 0   C: 01263 1   I: 71525 0   C: 01750 1   I: 77761 1   I: 73525 1
27,2170  C: 01750 1   I: 51361 1   C: 01263 1   I: 77656 1   C: 01271 1   I: 53435 0   C: 01277 1   C: 01263 1

27,2200  I: 77776 1   04161 0   C: 00004 0   05567 0   05060 1   C: 00354 0   32344 0   05663 1
27,2210  C: 02213 0   C: 56063 1   15303 0   05052 0   C: 00355 1   C: 00306 1   05701 1   C: 00310 0
27,2220    05060 1   C: 00307 0   15727 1   04117 1   C: 00011 1   32444 1   04246 0   C: 00002 0
27,2230    22007 0   47746 1   60000 1   60025 0   27123 1   37767 0   52025 1   53741 0

27,2240    32445 0   04246 0   C: 00002 0   00006 1   31744 1   05741 0   C: 02470 0   C: 56063 1
27,2250    04141 1   C: 00073 0   C: 25012 0   C: 77777 0   04141 1   C: 00002 0   C: 47016 0   C: 24404 1
27,2260  C: 02264 0   C: 56063 1   05701 1   C: 24404 1   32347 0   00006 1   01005 0   15727 1
27,2270    40076 1   77753 0   26076 1   04117 1   C: 00012 1   37763 1   05663 1   C: 02470 0

27,2300  C: 60066 1   04141 1   C: 00053 1   C: 47012 1   C: 01750 1   C: 02311 0   C: 56063 1   05701 1
27,2310  C: 01750 1   32343 1   55310 0   04161 0   C: 47012 1   C: 04064 1   C: 02322 0   C: 56063 1
27,2320    05701 1   C: 04064 1   37767 0   04246 0   C: 00006 1   37767 0   00006 1   01006 0
27,2330    00006 1   01005 0   05101 1   C: 00272 0   C: 00310 0   05060 1   C: 00273 1   04161 0

27,2340  C: 00002 0   15727 1   C: 02251 0   C: 02273 0   C: 02260 1   C: 37116 0   C: 32623 1   C: 00252 1
27,2350    00004 0   37767 0   12355 1   00004 0   37762 0   54001 1   40076 1   77752 1
27,2360    00006 1   15567 1   40076 1   77753 0   00006 1   12371 1   04755 1   C: 00300 1
27,2370    05567 0   00004 0   35352 0   54003 0   23742 1   32342 0   55310 0   04141 1
```

OCTAL LISTING OF PARAGRAPH # 155, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
27,2400   C; 00004 0   C; 00006 1     04141 1   C; 00003 1   C; 07022 0   C; 21000 1   C; 02414 1   C; 56063 1
27,2410     06060 1   C; 01000 0     05225 1   C; 02354 1     00004 0     37763 1     05663 1   C; 02470 0
27,2420   C; 60066 1     04141 1   C; 00053 1   C; 04022 0     00004 0     35651 0     54063 0     00006 1
27,2430     51742 1     32435 1     05526 0     15567 1   C; 02000 0   C; 52064 1   C; 02000 0   C; 66064 0

27,2440   C; 02341 0   C; 16064 1   C; 02324 0   C; 60064 0   C; 00061 0   C; 00063 1     35643 0     05516 0
27,2450   C; 02453 1   C; 56065 1     05727 0     41307 0     61743 0     00006 1     62461 0     67744 1
27,2460     67744 1     54147 1     06112 0   I; 56335 1   C; 00150 0   C; 16503 0   I; 63361 0   C; 01025 1
27,2470   C; 00404 1   I; 76455 1   C; 01765 1   I; 53361 0   C; 21165 0   I; 77655 1   C; 01017 0   C; 01017 0

27,2500   I; 77776 1     05567 0   C; 77633 1   C; 77777 0     04117 1   C; 00013 0     36306 1     54764 0
27,2510     04161 0   C; 47012 1   C; 13560 0   C; 02526 1   C; 56063 1     37756 1     04105 1     32525 1
27,2520     00004 0     05663 1   C; 02526 1   C; 56063 1     15567 1   C; 13560 0     06076 0   C; 00400 0
27,2530     06067 0   C; 20000 0     04161 0   C; 27042 1   C; 75232 0   C; 02547 0   C; 56063 1     00006 1

27,2540     32546 1     05741 0   C; 02547 0   C; 56063 1     15727 1   C; 00004 0   C; 00100 0     05060 1
27,2550   C; 00152 1     04141 1   C; 00002 0   C; 05013 0   C; 77777 0     05126 1   C; 00001 0   C; 00007 0
27,2560   C; 01772 1     06067 0   C; 00001 0     15727 1     04117 1   C; 00015 0     04161 0   C; 05022 1
27,2570   C; 20000 0     37754 0     04105 1     37763 1     00004 0     05663 1   C; 02601 1   C; 56063 1

27,2600     05567 0     05101 1   C; 00354 0   C; 02260 1     05073 0   C; 00355 1   C; 00306 1   C; 00310 0
27,2610     05101 1   C; 00307 0   C; 00144 0     37747 1     05516 0   C; 02670 1   C; 56063 1     04141 1
27,2620   C; 00054 0   C; 05012 1   C; 77777 0     05073 0   C; 00266 0   C; 00032 0   C; 13560 0     05101 1
27,2630   C; 00033 1   C; 13560 0     05101 1   C; 00267 1   C; 02734 0     35656 1     05505 1   C; 02642 0

27,2640   C; 56063 1     05727 0     30076 0     77751 1     00006 1     12647 1     04143 0     05206 0
27,2650   C; 26743 0     04743 0     04161 0   C; 00002 0     04141 1   C; 00004 0   C; 05023 0   C; 30000 1
27,2660     00004 0     05206 0   C; 40054 1     05126 1   C; 00002 0   C; 00011 1   C; 01773 0     04272 1
27,2670     00006 1     30025 0     52145 0     00006 1     31741 1     20145 0     37767 0     54153 1

27,2700     06112 0   I; 54201 0   C; 00001 0   C; 20617 0   I; 56371 1   C; 01754 0   C; 17113 1   I; 77606 1
27,2710   I; 51025 1   C; 17111 0   C; 56710 1   I; 56215 1   C; 17111 0   C; 17111 0   I; 73406 1   I; 71525 0
27,2720   I; 65205 0   C; 17073 0   I; 43205 1   C; 17071 1   I; 77725 1   I; 54205 1   C; 17067 0   C; 20210 0
27,2730   I; 77625 0   I; 43215 0   C; 17065 1   C; 17107 1   I; 51025 1   C; 17105 0   C; 56734 1   I; 62415 0

27,2740   C; 17103 0   I; 77606 1   I; 57546 1   C; 00007 0   I; 77605 1   C; 17077 1   C; 00017 1   I; 77605 1
27,2750   C; 17101 1   C; 14021 1   C; 00001 0   I; 77756 0   C; 00015 0   I; 57405 1   C; 17077 1   C; 00011 1
27,2760   I; 77605 1   C; 17101 1   C; 14013 0   C; 17077 1   I; 77742 0   C; 14005 1   C; 17075 0   I; 57542 0
27,2770   C; 14003 1   C; 17103 0   C; 00001 0   I; 64375 1   C; 00001 0   C; 01263 1   I; 77772 0   C; 24001 0
```

OCTAL LISTING OF PARAGRAPH # 156, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
27,3000   C: 00007 0   I: 76521 0   C: 01263 1   C: 24007 0   C: 00015 0   I: 76521 0   C: 01263 1   C: 00015 0
27,3010   I: 77776 1      50110 1      52003 0      50110 1      52007 1      50110 1      52003 0      50110 1
27,3020      52005 0      50110 1      52015 1      50110 1      52005 0      50110 1      52013 1      50110 1
27,3030      52017 0      50110 1      52013 1      06112 0   I: 74001 0   C: 00023 0   C: 00000 1   I: 77624 1

27,3040   C: 70711 1   I: 47131 1   C: 01653 0   C: 00004 0   C: 33526 0   C: 01632 1   I: 77776 1      06076 0
27,3050   C: 04000 0      06060 1   C: 02000 0      04161 0   C: 05024 1   C: 20000 0      37746 0      00004 0
27,3060      05516 0   C: 02067 1   C: 70063 0      05567 0   C: 02142 1   C: 00045 0   C: 00054 0   C: 33312 1
27,3070   C: 00053 1   C: 17056 1   C: 77774 0   C: 66451 1   C: 14566 1   C: 11602 0   C: 35467 1   C: 21173 1

27,3100   C: 15700 1   C: 31171 1   C: 00000 1   C: 00000 1   C: 10000 0   C: 00000 1   C: 01000 0   C: 00000 1
27,3110   C: 26650 0   C: 00000 1   C: 00020 0   C: 17260 0      06067 0   C: 04000 0      00006 1      30025 0
27,3120      53567 0      04117 1   C: 00034 0      22007 0      33320 0      56001 0      21567 0      33320 0
27,3130      00004 0      05663 1   C: 03175 1   C: 56064 0      00006 1      31567 1      53670 0      00006 1

27,3140      33317 1      21670 0      00003 1      00006 1      32441 1      52006 0      00006 1      33325 0
27,3150      52006 0      06112 0   I: 43131 0   C: 01653 0   C: 00004 0   C: 01063 0   I: 77776 1      35642 1
27,3160      00004 0      05516 0   C: 02001 1   C: 70063 0      37763 1      00004 0      05663 1   C: 03341 1
27,3170   C: 56064 0      05206 0   C: 26743 0      04743 0      05567 0      37763 1      05663 1   C: 02000 0

27,3200   C: 60065 1      04161 0   C: 00335 1      37751 0      70076 1      10000 0      13334 1      04117 1
27,3210   C: 00046 0      33323 0      55310 0      00006 1      33333 1      53073 0      00006 1      33327 1
27,3220      53075 0      05270 1   C: 40277 1      05101 1   C: 00206 0   C: 03326 0      05270 1   C: 40062 1
27,3230      05701 1   C: 02342 0      05270 1   C: 40175 0      05701 1   C: 00062 0      05270 1   C: 40066 0

27,3240      04141 1   C: 00313 0   C: 00002 0      37747 1      04105 1      05701 1   C: 00372 1      00006 1
27,3250      33331 0      53073 0      05701 1   C: 01130 1      03353 1      00006 1      33322 1      05741 0
27,3260   C: 03263 0   C: 56064 0      13264 0      03410 1      47767 1      22007 0      53102 1      05727 0
27,3270      37763 1      00004 0      05663 1   C: 03277 0   C: 56064 0      05225 1   C: 60324 1      05270 1

27,3300   C: 40054 1      03410 1      05701 1   C: 00144 0      05060 1   C: 00207 1      05701 1   C: 05524 1
27,3310      06067 0   C: 00001 0      05727 0   C: 00144 0   C: 00310 0   C: 02260 1   C: 00000 1   C: 05670 0
27,3320   C: 33260 0   C: 00002 0   C: 02630 0   C: 02251 0   C: 02000 0   C: 64064 1   C: 03270 1   C: 56064 0
27,3330   C: 03005 1   C: 64064 1   C: 02324 0   C: 60065 1      35660 1      05505 1   C: 04743 0   C: 04062 1

27,3340      05727 0      05101 1   C: 00354 0   C: 02260 1      05073 0   C: 00355 1   C: 00306 1   C: 00310 0
27,3350      05060 1   C: 00307 0      05727 0      00006 1      23662 1      06060 1   C: 00200 0      05101 1
27,3360   C: 00176 1   C: 00144 0      05073 0   C: 00074 1   C: 00254 1   C: 00310 0      05073 0   C: 00075 0
27,3370   C: 00255 0   C: 01440 0      05073 0   C: 00076 0   C: 00256 0   C: 00310 0      05073 0   C: 00077 1
```

OCTAL LISTING OF PARAGRAPH # 157, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
27,3400    C: 00257 1   C: 01440 0     05101 1   C: 00374 1   C: 00310 0     05060 1   C: 00375 0     01662 1
27,3410       40076 1      77754 1     10000 0      00002 0      00006 1     23662 1      06076 0  C: 00200 0
27,3420       05101 1   C: 00376 0  C: 00144 0      05073 0   C: 00274 0  C: 00114 0  C: 00144 0     05101 1
27,3430    C: 00377 1   C: 00144 0     05073 0   C: 00275 1   C: 00115 1  C: 01440 0     05073 0  C: 00276 1

27,3440    C: 00116 1   C: 00144 0     05101 1   C: 00177 0   C: 00144 0     05052 0   C: 00277 0  C: 00117 0
27,3450       01662 1      00006 1     33333 1      53073 0      33262 1     55662 0      00006 1     33474 0
27,3460       53075 0      06067 0  C: 00020 0      36106 0      55310 0     04117 1   C: 00047 1     37743 0
27,3470       55745 1      55746 1     05727 0   C: 03475 1   C: 56064 0     04161 0   C: 40333 0     00004 0

27,3500       33521 1      05663 1  C: 03505 1   C: 56064 0      05567 0     05270 1   C: 40263 1     05060 1
27,3510    C: 00207 1      04141 1  C: 00003 1   C: 05012 1   C: 77777 0     03410 1      06067 0  C: 00001 0
27,3520       05727 0   C: 04704 0     04117 1   C: 00016 0      02670 1     37746 0      00004 0     05516 0
27,3530    C: 02067 1   C: 70066 0     00003 1      10067 1      05532 0     05206 0   C: 26743 0     13540 1

27,3540       33551 0      00004 0     05663 1   C: 03552 0   C: 56066 1     00003 1     33550 1     05545 0
27,3550    C: 57557 1   C: 01750 1     33550 1      05551 0      05270 1  C: 56204 1     05727 0     33606 1
27,3560       00004 0      05663 1  C: 03565 1   C: 56066 1      05567 0     37747 1     26077 0     05060 1
27,3570    C: 00136 0      05060 1  C: 00156 0      33600 1      05663 1  C: 03601 0  C: 56066 1     05727 0

27,3600    C: 00310 0      05060 1  C: 00137 1      05060 1   C: 00157 1     05727 0   C: 02424 1  C: 03607 0
27,3610    C: 03610 0  CKSM 63055 1        @           @           @           @           @           @
27,3620           @           @           @           @           @           @           @           @
27,3630           @           @           @           @           @           @           @           @

27,3640           @           @           @           @           @           @           @           @
27,3650           @           @           @           @           @           @           @           @
27,3660           @           @           @           @           @           @           @           @
27,3670           @           @           @           @           @           @           @           @

27,3700           @           @           @           @           @           @           @           @
27,3710           @           @           @           @           @           @           @           @
27,3720           @           @           @           @           @           @           @           @
27,3730           @           @           @           @           @           @           @           @

27,3740           @           @           @           @           @           @           @           @
27,3750           @           @           @           @           @           @           @           @
27,3760           @           @           @           @           @           @           @           @
27,3770           @           @           @           @           @           @           @           @
```

OCTAL LISTING OF PARAGRAPH # 160, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
30,2000    04161 0  C; 07015 1  C; 77777 0  C; 02011 0  C; 60065 1    35653 1    05505 1  C; 03575 0
30,2010 C; 24063 1     02574 0     06051 0  C; 00001 0     31337 1    55511 1    06076 0  C; 40000 0
30,2020    37751 0     54003 0     37746 0     55640 0     37767 0    55641 1    55642 1     55643 0
30,2030    55644 1     55645 0     37762 0     55161 1     35644 1    05516 0  C; 02412 1  C; 60064 0

30,2040    32235 1     05663 1  C; 02047 0  C; 60065 1     04161 0  C; 40025 1    15727 1     41000 1
30,2050    62125 0     00006 1     12060 1     41000 1     62126 0    00006 1    12121 0     12064 0
30,2060    40030 0     67743 0     00006 1     12121 0     02574 0    00006 1    32130 1     53110 1
30,2070    37762 0     55161 1     40075 1     77763 0     10000 0    02116 0    32235 1     05663 1

30,2100 C; 02047 0  C; 60065 1     37746 0     05516 0  C; 02133 1  C; 60065 1    00006 1     32132 0
30,2110    53110 1     40025 1     55123 1     15727 1  C; 02574 0  C; 60065 1    32124 1     55310 0
30,2120    12102 1     47763 0     26030 0     12064 0  C; 02366 0  C; 02015 1  C; 02572 0  C; 77746 1
30,2130 C; 00031 0  C; 77771 0  C; 00006 1     37762 0     55512 1    60000 1    50000 1     10403 1

30,2140    02142 1     02150 1     62233 1     00006 1     62150 1    04755 1  C; 00205 0     12152 1
30,2150    11512 1     12134 1     04161 0  C; 16035 0  C; 20000 0  C; 02161 0  C; 60065 1     05206 0
30,2160 C; 25222 1  I; 06112 0  I; 51575 1  C; 00404 1  C; 36535 1  C; 61206 1  I; 77624 1  C; 61137 0
30,2170 I; 77776 1     04161 0  C; 10035 0     00004 0     37760 1    54061 1    60000 1     54062 1

30,2200    00006 1     50062 0     31051 1     50062 0     53011 1    10061 1    12175 1     00006 1
30,2210    31560 0     53552 0     00006 1     31562 1     53321 1    00006 1    31307 1     53327 1
30,2220    37760 1     70075 1     00006 1     12230 0     35655 1    05505 1  C; 02713 0  C; 54066 0
30,2230    04161 0  C; 10035 0     01310 1  C; 63401 1  C; 00620 0  C; 00310 0  C; 00055 1     37762 0

30,2240    00006 1     02030 0     50000 1     42234 1     61534 1    00006 1    62256 1     31341 0
30,2250    55511 1     04161 0  C; 10035 0     00006 1     31073 1    52006 0    11511 1     12323 0
30,2260    30015 0     77757 1     10000 0     12317 1     04161 0  C; 10035 0    32315 1     55310 0
30,2270    00006 1     31075 1     52006 0     41534 0     62316 1    00006 1    62251 0     00004 0

30,2300    37746 0     05505 1  C; 02504 1  C; 56065 1     04161 0  C; 07022 0  C; 20000 0  C; 02504 1
30,2310 C; 56065 1     04161 0  C; 10035 0     32315 1     55310 0    02251 0  C; 01724 1     04755 1
30,2320 C; 01405 1     05225 1  C; 16007 1     55511 1     04161 0  C; 00035 1    15567 1     31336 0
30,2330    00006 1     12357 0     00006 1     47336 1     42365 1    61534 1    00006 1     62357 1

30,2340    40076 1     77760 0     00006 1     12237 1     37752 0    00006 1    02032 1     00006 1
30,2350    12357 0     00004 0     47762 1     70077 0     54077 0    00003 1    12237 1     00004 0
30,2360    40077 0     77762 1     26077 0     00003 1     12237 1  C; 00074 1    31307 1     54765 1
30,2370    06060 1  C; 40000 0     00006 1     32411 1     52006 0    04161 0  C; 04025 1     37756 1
```

OCTAL LISTING OF PARAGRAPH # 161, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
30,2400      70075 1      00006 1      14272 0      04161 0  C; 00005 1      06067 0  C; 00040 0      15567 1
30,2410  C; 02116 0  C; 16064 1      00004 0      37764 0      54070 1      50070 0      31514 0      50070 0
30,2420      55010 0      10070 1      12414 0      00006 1      31511 0      53327 1      00003 1      06112 0
30,2430  I; 45175 0  C; 01011 0  C; 61103 1  C; 01025 1  I; 77776 1      15567 1  I; 77420 1  C; 01155 1

30,2440      00004 0      37751 0      56003 1      54071 0      37764 0      54070 1      50070 0      31400 1
30,2450      50070 0      55010 0      10070 1      12445 1      00006 1      31777 1      53327 1      30071 1
30,2460      54003 0      00003 1      06112 0  I; 45175 0  C; 01011 0  C; 61103 1  C; 35025 0  C; 01155 1
30,2470      04161 0  C; 05013 0  C; 77777 0      06051 0  C; 20000 0      02547 0      05727 0      37746 0

30,2500      70075 1      00006 1      12542 1      02547 0      55422 0      31404 0      02526 1      31401 0
30,2510      00006 1      71420 1      55422 0      31405 1      02526 1      31403 1      00006 1      71420 1
30,2520      55422 0      31406 1      02526 1      06067 0  C; 10000 0      05727 0      00006 1      71416 1
30,2530      61422 1      00006 1      62534 1      40000 0      62546 1      54000 0      00002 0      06051 0

30,2540  C; 10000 0      05727 0      04161 0  C; 00003 1      05727 0  C; 00144 0  C; 40417 1      00006 1
30,2550      23422 1      32545 1      05663 1  C; 02477 1  C; 60066 1      30033 1      57412 1      00006 1
30,2560      20033 0      55416 1      30034 0      57413 0      00006 1      20034 1      55420 1      30032 0
30,2570      57411 1      00006 1      20032 1      01422 1      00006 1      30025 0      53307 0      47767 1

30,2600      55155 0      55156 0      55157 1      37767 0      54407 0      54405 1      55331 0      55333 1
30,2610      55335 1      55161 1      00006 1      40040 1      53156 0      52040 1      54403 1      22405 0
30,2620      40041 0      57157 0      56041 1      54407 0      30032 0      55330 1      30033 1      55332 0
30,2630      30034 0      55334 0      00002 0      11110 1      12636 1      15727 1      11161 1      12064 0

30,2640      32676 1      54002 1      10407 0      12624 1      12647 1      12624 1      12624 1      22007 0
30,2650      10405 1      12654 0      12663 1      12654 0      22041 1      11157 1      41157 1      12623 0
30,2660      12656 1      22407 1      12624 1      11155 0      41155 0      12670 0      12664 0      12612 1
30,2670      54403 1      41156 0      54405 1      47767 1      52040 1      12620 0  C; 02065 0  C; 24276 1

30,2700  C; 14076 0  C; 00002 0  C; 00545 0  I; 77401 1  C; 00001 0      31332 1      55654 0      31334 1
30,2710      55656 1      31330 0      55660 1      35632 0      56003 1      54144 1      37767 0      55155 0
30,2720      55156 0      00004 0      31415 0      00006 1      70000 0      21156 0      31416 0      00006 1
30,2730      70000 0      21156 0      31420 0      00006 1      70000 0      21156 0      00003 1      56144 0

30,2740      54003 0      06112 0  I; 77620 0  C; 01304 1  I; 45345 1  C; 01156 1  C; 20702 0  I; 72044 1
30,2750  C; 60774 0  C; 00110 1  I; 64110 0  C; 00024 1  C; 00050 1  I; 77775 1  C; 02455 1  C; 00025 0
30,2760  I; 53575 0  C; 00404 1  C; 00041 1  I; 77624 1  C; 32531 1  I; 52201 0  C; 00001 0  C; 02241 1
30,2770  I; 53322 1  C; 02241 1  I; 77656 1  C; 02241 1  I; 62150 1  C; 00110 1  C; 00024 1  I; 77320 0
```

OCTAL LISTING OF PARAGRAPH # 162, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

30,3000	C: 00050 1	C: 02255 1	C: 00025 0	I: 77775 1	C: 02241 1	C: 00041 1	I: 77624 1	C: 32555 0
30,3010	I: 47201 1	C: 00001 0	C: 02233 1	I: 77761 1	C: 20700 1	C: 00013 0	I: 77624 1	C: 61064 1
30,3020	I: 41345 0	C: 00013 0	C: 02251 0	I: 41325 0	C: 00017 1	C: 02257 0	I: 77621 1	I: 77671 1
30,3030	C: 02253 1	C: 00025 0	I: 72405 0	C: 02261 0	I: 77621 1	C: 00015 0	C: 14027 1	C: 00013 0
30,3040	I: 65205 0	C: 02257 0	C: 00017 1	I: 43205 1	C: 02251 0	I: 77752 1	C: 14031 0	C: 00027 1
30,3050	I: 57405 1	C: 02261 0	I: 77752 1	C: 00025 0	I: 53375 0	C: 00025 0	C: 01331 1	I: 77634 0
30,3060	C: 33526 0	C: 00767 1	I: 77650 1	C: 01304 1	I: 76131 0	C: 00051 0	C: 00002 0	C: 00006 1
30,3070	I: 47133 0	C: 01337 1	C: 33457 1	C: 05337 0	I: 77756 0	C: 06263 0	I: 71543 0	C: 01337 1
30,3100	C: 06255 0	I: 43500 0	C: 61070 1	I: 77656 1	C: 01033 0	I: 41441 0	C: 01041 0	I: 56316 0
30,3110	C: 21171 0	I: 65221 0	C: 21167 1	C: 00045 0	C: 15047 0	C: 21173 1	I: 77671 1	C: 00043 0
30,3120	C: 00041 1	I: 77605 1	I: 65361 0	C: 01033 0	I: 74205 0	C: 00041 1	C: 01041 0	I: 53255 0
30,3130	C: 01033 0	I: 56325 0	C: 21175 1	C: 00043 0	I: 45561 1	C: 76712 1	I: 77616 0	I: 74375 0
30,3140	C: 00404 1	C: 21165 0	I: 44006 1	C: 00037 0	I: 41455 0	C: 01025 1	I: 74255 0	C: 01017 0
30,3150	C: 21177 0	I: 77655 1	C: 01011 0	C: 35051 0	C: 61103 1	I: 53255 0	I: 77655 1	C: 01017 0
30,3160	C: 35057 0	C: 00037 0	C: 03215 1	C: 27057 0	C: 00150 0	C: 33343 0	C: 04000 0	C: 00000 1
30,3170	C: 03146 1	C: 14632 0	C: 00036 1	C: 30103 0	C: 77774 0	C: 53772 0	C: 00031 0	C: 00000 1
30,3200	C: 04000 0	C: 00000 1	C: 00224 0	C: 17561 0	C: 00164 1	C: 34414 1	I: 43145 0	C: 01321 0
30,3210	C: 00753 0	C: 61373 1	I: 74375 0	C: 00404 1	C: 21163 0	I: 51406 1	C: 03624 1	I: 56206 0
30,3220	C: 21400 0	C: 01325 1	I: 77776 1	33444 0	54003 0	00006 1	31325 1	03445 1
30,3230	53546 0	41545 0	63401 1	00006 1	63241 0	00006 1	43404 0	53556 1
30,3240	13252 0	00006 1	00030 1	40000 0	77762 1	00006 1	13456 1	00006 1
30,3250	43406 1	53556 1	00006 1	33415 1	53564 0	13351 1	00006 1	33417 0
30,3260	53564 0	37767 0	55544 1	37761 0	27544 1	41545 0	51544 0	63414 0
30,3270	00006 1	63263 0	40000 0	00006 1	51544 0	73415 0	53550 1	00006 1
30,3300	51544 0	33417 0	21550 1	43700 1	60000 1	56002 0	00006 1	31546 1
30,3310	00006 1	10002 1	55545 0	33412 0	00006 1	71551 0	63411 0	00006 1
30,3320	71545 0	00006 1	71545 0	53554 0	33410 1	00006 1	71551 0	63407 1
30,3330	00006 1	71545 0	21554 0	31553 0	00006 1	73377 0	53560 1	00006 1
30,3340	31552 1	21560 1	31557 1	00006 1	73413 0	53556 1	00006 1	41550 1
30,3350	21556 1	37767 0	54153 1	54111 1	06112 0	I: 60545 0	I: 41471 0	C: 02556 0
30,3360	C: 01321 0	I: 77615 0	C: 01321 0	C: 02562 1	I: 51025 1	C: 02564 1	C: 00052 0	I: 77745 1
30,3370	C: 02564 1	C: 02562 1	I: 77616 0	C: 16562 1	C: 26643 1	C: 02560 0	I: 77616 0	C: 14400 0

OCTAL LISTING OF PARAGRAPH # 163, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

30,3400	C; 00000 1	C; 00411 0	C; 05423 1	C; 15165 1	C; 30244 0	C; 17114 0	C; 33562 0	C; 00316 0
30,3410	C; 76221 1	C; 77312 1	C; 02447 1	C; 01503 0	C; 02035 0	C; 07567 1	C; 06062 0	C; 20000 0
30,3420	C; 01713 0	C; 11736 0	C; 16445 0	C; 06644 1	C; 03625 0	C; 76531 1	C; 16375 1	C; 01343 1
30,3430	C; 06275 1	C; 06741 0	C; 17033 1	C; 07603 0	C; 07100 1	C; 76601 1	C; 17014 1	C; 05573 0
30,3440	C; 37777 1	C; 00000 1	C; 17014 1	C; 05573 0	C; 02565 0	00006 1	22120 1	52145 0
30,3450	07155 1	C; 01320 1	07155 1	C; 03533 1	52146 0	00120 1	47767 1	55576 0
30,3460	55577 1	22007 0	53100 0	15727 1	C; 00303 1	C; 00310 0	53575 0	35647 1
30,3470	00004 0	05505 1	C; 03507 0	C; 60065 1	00003 1	13505 0	53575 0	35610 1
30,3500	00004 0	05505 1	C; 03540 0	C; 60065 1	00003 1	53575 0	52006 0	00004 0
30,3510	33464 1	05663 1	C; 03456 0	C; 60065 1	04141 1	C; 40031 1	C; 05024 1	C; 25000 0
30,3520	00006 1	43701 0	52145 0	31323 1	07357 1	52145 0	53571 1	37767 0
30,3530	55576 0	55577 1	13547 0	C; 00063 1	C; 36233 0	C; 31000 0	C; 74034 0	C; 00666 1
30,3540	04161 0	C; 05024 1	C; 30000 1	00006 1	31323 1	03445 1	53571 1	00006 1
30,3550	31325 1	03445 1	53566 1	00006 1	31577 0	21566 1	47767 1	55574 1
30,3560	43704 0	61567 1	00006 1	63567 0	43677 0	61565 0	55574 1	40075 1
30,3570	77757 1	00006 1	13577 0	33537 0	55567 0	43537 1	55574 1	31570 1
30,3600	63536 1	00006 1	63620 0	41570 0	63704 1	00006 1	63613 0	43704 0
30,3610	61567 1	00006 1	63620 0	00006 1	33703 0	53571 1	43536 0	55574 1
30,3620	04161 0	C; 04024 0	00006 1	31571 0	55567 0	53573 0	00006 1	41566 1
30,3630	21573 0	03713 1	31572 0	61574 0	54055 0	04161 0	C; 04024 0	37760 1
30,3640	00006 1	05014 1	00006 1	30025 0	52145 0	00006 1	41307 0	20145 0
30,3650	33465 0	56145 1	77743 1	00006 1	10145 0	00006 1	71572 1	53577 1
30,3660	33535 1	56144 0	11572 1	67763 1	13666 0	67763 1	00006 1	71572 1
30,3670	00006 1	10144 1	22007 0	21577 1	04161 0	C; 00004 0	15567 1	C; 07432 0
30,3700	C; 70325 1	C; 77777 0	C; 07100 1	C; 00000 1	C; 04314 0	06076 0	C; 00010 0	47767 1
30,3710	22007 0	53100 0	15727 1	31572 0	00006 1	63717 0	40000 0	63770 1
30,3720	00006 1	63750 0	31565 0	60000 1	54120 0	31570 1	00006 1	10120 0
30,3730	54120 0	35632 0	54003 0	30120 1	00006 1	71563 1	60000 1	57563 0
30,3740	30120 1	00006 1	71565 1	60000 1	57565 0	35661 0	54003 0	13632 1
30,3750	00004 0	40077 0	77762 1	26077 0	33464 1	05663 1	C; 03705 0	C; 60065 1
30,3760	06060 1	C; 00010 0	04161 0	C; 47011 1	C; 00303 1	C; 03705 0	C; 60065 1	13632 1
30,3770	C; 00302 0	C; 03771 0	C; 03772 0	CKSM 03003 1	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 164, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

31,2000	36311 1	54070 1	50000 1	11164 1	12010 0	12055 1	67763 1	40000 0
31,2010	50070 0	55174 0	10070 1	12001 0	11201 1	12034 0	36311 1	54070 1
31,2020	45343 1	50070 0	71164 1	00006 1	12033 1	10070 1	12017 1	35633 1
31,2030	05516 0	C; 02247 1	C; 16064 1	55204 1	55201 1	04161 0	C; 00113 1	32054 1
31,2040	05663 1	C; 02000 0	C; 62062 1	00006 1	31175 0	53165 0	00006 1	31177 1
31,2050	53167 1	04161 0	C; 40133 1	05727 0	C; 00144 0	30070 0	55200 0	50070 0
31,2060	31170 0	00006 1	12410 1	54764 0	00006 1	76311 0	50001 0	32333 0
31,2070	54071 0	77765 0	70076 1	10000 0	12117 0	35660 1	70071 0	54063 0
31,2100	00006 1	50001 0	32335 0	05526 0	04141 1	C; 00032 0	C; 00003 1	02121 1
31,2110	35210 1	05505 1	C; 02145 0	C; 62062 1	06076 0	C; 00020 0	05727 0	02121 1
31,2120	12012 1	47767 1	51200 1	55164 1	51200 1	55170 1	51200 1	55174 0
31,2130	00002 0	30764 1	00006 1	76311 0	50001 0	32333 0	75660 0	54063 0
31,2140	00006 1	50001 0	32335 0	05526 0	12107 1	32373 1	54304 1	05206 0
31,2150	C; 12314 1	05225 1	C; 11333 1	02265 1	12351 0	02221 1	12161 1	02221 1
31,2160	02265 1	31202 0	50070 0	55170 1	12351 0	47762 1	61204 0	04323 1
31,2170	C; 77776 1	12356 1	51204 0	37760 1	54001 1	30076 0	00006 1	06001 0
31,2200	54076 1	12351 0	40076 1	77757 1	10000 0	12356 1	47754 1	61204 0
31,2210	04323 1	C; 77600 1	12356 1	32220 0	55203 0	32164 0	55205 0	01203 1
31,2220	05060 1	30002 0	02250 1	11202 1	12230 0	12356 1	12356 1	12356 1
31,2230	04323 1	C; 77756 0	12356 1	41202 1	66306 1	10000 0	12356 1	C; 72400 0
31,2240	12242 0	12356 1	50000 1	37745 0	12237 1	00006 1	12356 1	01207 0
31,2250	55207 1	11204 1	12256 0	12356 1	12356 1	12356 1	75340 1	10000 0
31,2260	12356 1	41204 1	67761 0	54070 1	00002 0	30002 0	02250 1	50070 0
31,2270	11164 1	12276 1	12276 1	12274 0	31203 1	12303 1	11203 0	12306 1
31,2300	12303 1	12306 1	47767 1	50070 0	55164 1	01207 0	02314 0	10000 0
31,2310	01207 0	01207 0	37767 0	12303 1	31203 1	50070 0	61164 0	54000 0
31,2320	12322 1	02356 0	50070 0	55164 1	00002 0	06112 0	I; 44234 1	C; 33454 1
31,2330	C; 01206 1	I; 54205 1	C; 22372 1	C; 20217 1	I; 50004 0	C; 62356 0	C; 62355 0	I; 77776 1
31,2340	00004 0	37757 0	70076 1	00006 1	12356 1	02251 0	30144 0	50070 0
31,2350	55164 1	37767 0	04246 0	C; 00006 1	15567 1	I; 77776 1	04371 0	12351 0
31,2360	C; 20010 1	C; 02474 1	C; 52064 1	C; 20012 0	C; 02564 1	C; 56063 1	C; 20010 1	C; 02724 1
31,2370	C; 66064 0	C; 00243 1	C; 32703 1	C; 00034 0	C; 20010 1	C; 02000 0	C; 74064 0	04736 1

OCTAL LISTING OF PARAGRAPH # 165, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

31,2400	04736 1	04736 1	C: 20010 1	C: 03114 0	C: 56064 0	04736 1	04736 1	04736 1
31,2410	04755 1	C: 00601 0	35660 1	05505 1	C: 02007 1	C: 16063 0	05727 0	C: 02417 1
31,2420	C: 02420 0	CKSM 00001 0	@	@	@	@	@	@
31,2430	@	@	@	@	@	@	@	@
31,2440	@	@	@	@	@	@	@	@
31,2450	@	@	@	@	@	@	@	@
31,2460	@	@	@	@	@	@	@	@
31,2470	@	@	@	@	@	@	@	@
31,2500	@	@	@	@	@	@	@	@
31,2510	@	@	@	@	@	@	@	@
31,2520	@	@	@	@	@	@	@	@
31,2530	@	@	@	@	@	@	@	@
31,2540	@	@	@	@	@	@	@	@
31,2550	@	@	@	@	@	@	@	@
31,2560	@	@	@	@	@	@	@	@
31,2570	@	@	@	@	@	@	@	@
31,2600	@	@	@	@	@	@	@	@
31,2610	@	@	@	@	@	@	@	@
31,2620	@	@	@	@	@	@	@	@
31,2630	@	@	@	@	@	@	@	@
31,2640	@	@	@	@	@	@	@	@
31,2650	@	@	@	@	@	@	@	@
31,2660	@	@	@	@	@	@	@	@
31,2670	@	@	@	@	@	@	@	@
31,2700	@	@	@	@	@	@	@	@
31,2710	@	@	@	@	@	@	@	@
31,2720	@	@	@	@	@	@	@	@
31,2730	@	@	@	@	@	@	@	@
31,2740	@	@	@	@	@	@	@	@
31,2750	@	@	@	@	@	@	@	@
31,2760	@	@	@	@	@	@	@	@
31,2770	@	@	@	@	@	@	@	@

OCIAL LISTING OF PARAGRAPH # 170, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "e" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

32,2000	53447 0	35644 1	55451 1	06112 0	I: 77624 1	C: 60436 0	I: 77775 1	C: 01011 0	
32,2010	I: 53435 0	C: 01017 0	C: 02015 1	I: 76435 1	C: 01033 0	I: 63361 0	C: 03602 0	C: 01033 0	
32,2020	I: 51361 1	C: 03604 0	I: 77626 0	C: 75770 0	I: 76435 1	C: 02015 1	C: 26001 1	C: 24111 0	
32,2030	C: 26023 1	C: 24117 0	C: 16031 1	C: 26641 0	C: 16061 1	C: 26643 1	C: 26037 1	C: 03606 1	
32,2040	C: 16041 0	C: 03576 0	C: 02057 1	I: 71331 0	C: 02051 1	C: 64067 1	C: 03600 1	C: 02141 1	
32,2050	I: 43261 0	C: 20614 0	C: 02377 0	C: 02053 0	I: 43014 0	C: 02067 1	C: 02266 1	I: 77614 1	
32,2060	C: 02070 1	I: 43014 0	C: 02263 1	C: 02061 1	I: 52014 0	C: 02271 1	C: 64125 0	I: 43175 0	
32,2070	C: 02233 1	C: 02063 0	C: 25656 0	C: 26641 0	C: 01664 1	I: 43014 0	C: 02061 1	C: 02273 0	
32,2100	I: 77776 1	32124 1	55450 0	55643 0	55451 1	00006 1	31447 1	52006 0	
32,2110	C: 05327 1	C: 16434 0	C: 07446 0	C: 31055 0	C: 26270 0	C: 16315 1	C: 03627 1	C: 35747 0	
32,2120	C: 03624 1	C: 03045 0	C: 03620 0	C: 10142 1	C: 60703 0	I: 70375 1	C: 01065 0	C: 24672 1	
32,2130	I: 50360 1	C: 00005 1	C: 01033 0	I: 47515 0	C: 01033 0	C: 01017 0	I: 56236 0	C: 01047 0	
32,2140	I: 43352 1	I: 77614 1	C: 02306 0	C: 66307 0	C: 26111 1	C: 01033 0	I: 53435 0	C: 02007 1	
32,2150	C: 02077 0	I: 57435 1	C: 02007 1	I: 63372 1	C: 01033 0	I: 72441 0	C: 01017 0	C: 26147 1	
32,2160	C: 02077 0	I: 72441 0	C: 01017 0	C: 26105 1	C: 02077 0	I: 76435 1	C: 01033 0	C: 02071 0	
32,2170	I: 72441 0	C: 01017 0	C: 26067 1	C: 00001 0	I: 62441 1	C: 02015 1	I: 63406 0	I: 41206 0	
32,2200	C: 24670 0	I: 41215 1	C: 24700 0	I: 41215 1	C: 26641 0	I: 60405 0	C: 02375 1	I: 50315 0	
32,2210	C: 01033 0	C: 02007 1	C: 02151 0	I: 41316 0	C: 24704 1	I: 41215 1	C: 24702 1	C: 02151 0	
32,2220	I: 42405 0	C: 02375 1	I: 45325 1	C: 02141 1	C: 24706 0	C: 02141 1	I: 71214 0	C: 02351 1	
32,2230	C: 64241 1	C: 02147 1	I: 41215 1	C: 02041 0	C: 02141 1	I: 43342 0	C: 01047 0	I: 77742 0	
32,2240	C: 02375 1	I: 77614 1	C: 02347 0	C: 64404 0	I: 71214 0	C: 02341 0	C: 64404 0	C: 02067 1	
32,2250	I: 65205 0	C: 02141 1	C: 02043 1	I: 43605 1	C: 02141 1	I: 43257 0	C: 20172 1	I: 77626 0	
32,2260	C: 63736 0	C: 02105 1	I: 41215 1	C: 02045 1	C: 02141 1	I: 43257 0	C: 20167 0	I: 56471 0	
32,2270	C: 02375 1	C: 05740 1	I: 71406 0	I: 73525 1	I: 74206 0	C: 02015 1	I: 74325 0	C: 00007 0	
32,2300	C: 02001 1	I: 77655 1	I: 77725 1	C: 00041 1	I: 65316 0	C: 02375 1	I: 45316 1	I: 74366 1	
32,2310	I: 65372 1	C: 00041 1	I: 53361 0	C: 02007 1	I: 77772 0	I: 77614 1	C: 02350 0	C: 64321 0	
32,2320	C: 02340 1	C: 03614 1	I: 53435 0	C: 02365 0	I: 52165 1	C: 03622 1	C: 65054 0	C: 02153 1	
32,2330	I: 53435 0	C: 02007 1	I: 77601 0	C: 00001 0	C: 16133 1	C: 02373 1	I: 43025 1	C: 02053 0	
32,2340	C: 02310 1	C: 64344 0	I: 70415 0	C: 02143 0	C: 02143 0	I: 77614 1	C: 02261 0	I: 77614 1	
32,2350	C: 02200 1	C: 65001 0	I: 77776 1	31451 0	00004 0	05516 0	C: 02711 1	C: 64063 0	
32,2360	00003 1	10067 1	05532 0	06112 0	I: 41575 0	C: 02324 0	I: 72441 0	C: 02153 1	
32,2370	C: 26041 0	C: 00001 0	I: 72441 0	C: 02133 1	C: 26045 1	C: 02153 1	I: 50235 0	C: 02133 1	

OCTAL LISTING OF PARAGRAPH # 171, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

32,2400	I; 51512 0	C; 26043 1	C; 03614 1	C; 02340 1	I; 40345 1	C; 02043 1	C; 00003 1	I; 41425 1
32,2410	C; 02067 1	C; 14041 1	C; 02045 1	I; 77625 0	C; 02105 1	C; 00001 0	C; 14037 0	C; 02111 1
32,2420	I; 72405 0	C; 02141 1	I; 45325 1	C; 02041 0	C; 02147 1	C; 00035 1	I; 55425 1	I; 77626 0
32,2430	C; 75445 0	I; 45246 0	C; 02057 1	I; 41471 0	C; 02025 1	I; 44205 0	C; 03627 1	C; 26641 0
32,2440	I; 41215 1	C; 26641 0	I; 41206 0	C; 02027 0	C; 02141 1	I; 50025 0	C; 24674 1	C; 64714 1
32,2450	I; 47014 1	C; 02206 1	C; 66313 0	C; 33454 1	C; 02107 0	I; 54345 1	C; 02141 1	C; 20614 0
32,2460	C; 02346 1	I; 43214 1	C; 02210 0	C; 64472 1	C; 02107 0	C; 16053 0	C; 24710 1	I; 51025 1
32,2470	C; 02141 1	C; 64571 0	I; 45345 1	C; 02107 0	C; 24664 0	C; 16055 0	C; 02141 1	I; 43205 1
32,2500	C; 02147 1	C; 01047 0	I; 44342 1	C; 02375 1	C; 14033 1	I; 43221 1	C; 26641 0	C; 26641 0
32,2510	I; 77624 1	C; 65060 1	I; 41461 1	C; 20206 1	I; 44265 0	C; 02141 1	C; 02027 0	I; 45325 1
32,2520	C; 02141 1	C; 24676 0	I; 71244 0	C; 64531 1	C; 26643 1	C; 02131 0	I; 77614 1	C; 02031 1
32,2530	C; 64553 0	I; 45345 1	C; 02141 1	C; 00005 1	I; 70525 1	C; 02141 1	I; 54225 0	C; 00005 1
32,2540	C; 20206 1	I; 41325 0	C; 00035 1	C; 00005 1	I; 45342 0	C; 00033 1	I; 56271 0	C; 02141 1
32,2550	I; 77601 0	C; 00005 1	C; 02131 0	I; 56345 0	C; 00035 1	C; 00001 0	I; 65342 1	I; 54205 1
32,2560	C; 02131 0	C; 20206 1	I; 77621 1	I; 77626 0	C; 61664 1	C; 00041 1	I; 70471 1	C; 00001 0
32,2570	C; 02065 0	I; 77601 0	C; 00001 0	I; 45345 1	C; 02107 0	C; 02055 0	I; 54205 1	C; 02131 0
32,2600	C; 20221 1	I; 56215 1	C; 02113 0	C; 02027 0	I; 74225 1	C; 02111 1	C; 01033 0	I; 56325 0
32,2610	C; 02065 0	C; 02027 0	I; 53361 0	C; 02071 0	I; 41572 1	I; 65246 1	C; 02023 1	I; 45316 1
32,2620	C; 00043 0	I; 41325 0	C; 02023 1	C; 02061 1	I; 41552 0	I; 45316 1	C; 00043 0	I; 71240 1
32,2630	C; 64635 0	C; 00011 1	I; 77766 0	I; 77650 1	C; 64645 1	I; 55345 0	C; 00007 0	I; 77761 1
32,2640	C; 00001 0	C; 14001 0	C; 02023 1	I; 77605 1	C; 02037 1	I; 74365 1	C; 00037 0	C; 02077 0
32,2650	I; 53372 1	C; 00001 0	I; 77656 1	C; 02233 1	I; 45001 1	C; 00001 0	C; 02050 0	I; 77776 1
32,2660	04161 0	C; 00035 1	15567 1	C; 00000 1	C; 00144 0	C; 12702 1	C; 21727 0	C; 01146 0
32,2670	C; 14632 0	C; 00014 1	C; 20000 0	C; 00062 0	C; 00000 1	C; 00175 1	C; 00000 1	C; 02525 1
32,2700	C; 12525 0	C; 10000 0	C; 00000 1	C; 25252 0	C; 25253 1	C; 00031 0	C; 00000 1	C; 00031 0
32,2710	C; 00000 1	06112 0	I; 77624 1	C; 14625 0	I; 71214 0	C; 02313 1	C; 64450 1	C; 02141 1
32,2720	I; 77452 1	00004 0	37751 0	54003 0	30144 0	55566 1	00006 1	62751 0
32,2730	05663 1	C; 02757 0	C; 64064 1	40100 1	77754 1	00006 1	12144 0	04161 0
32,2740	C; 47012 1	C; 76211 1	C; 02757 0	C; 64064 1	00003 1	06112 0	I; 52014 0	C; 02073 1
32,2750	C; 64450 1	02773 0	05206 0	C; 40263 1	05206 0	C; 40114 1	12660 1	02773 0
32,2760	05270 1	C; 40263 1	05270 1	C; 40114 1	40100 1	77754 1	00006 1	15727 1
32,2770	04161 0	C; 00002 0	05727 0	00006 1	33000 1	53073 0	00002 0	C; 02324 0

OCTAL LISTING OF PARAGRAPH # 172, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

32,3000	C; 60065 1	I; 77776 1	04755 1	C; 00405 0	12353 1	06112 0	I; 57545 1	C; 02556 0
32,3010	I; 77742 0	C; 02025 1	I; 67201 0	C; 00001 0	C; 25052 1	I; 77471 0	C; 03624 1	52145 0
32,3020	53435 0	53433 0	53431 1	52145 0	06112 0	I; 77615 0	C; 02031 1	I; 43415 0
32,3030	C; 02033 0	C; 02035 0	I; 41205 0	C; 02025 1	C; 21400 0	I; 65252 1	C; 02027 0	I; 43342 0
32,3040	I; 77625 0	C; 25053 0	C; 16027 0	C; 02025 1	I; 56342 1	C; 02027 0	C; 02023 1	I; 77650 1
32,3050	C; 64125 0	C; 00010 0	C; 00045 0	C; 20000 0	C; 25715 0	C; 02340 1	I; 52056 0	C; 64327 0
32,3060	I; 44301 0	C; 00153 0	C; 25127 1	I; 77776 1	07274 1	C; 00006 1	C; 00000 1	C; 00002 0
32,3070	C; 76777 1	C; 77175 1	C; 77400 0	C; 75416 0	C; 77507 0	C; 65515 0	C; 77741 0	C; 63547 1
32,3100	C; 77052 0	C; 55373 0	C; 01167 0	C; 30361 0	C; 76520 1	C; 75267 0	37767 0	54146 0
32,3110	00006 1	33125 1	52145 0	52122 1	30152 1	07357 1	52146 0	52145 0
32,3120	52122 1	20145 0	06112 0	I; 43476 0	C; 00542 1	C; 34414 1	C; 37777 1	C; 37777 1
32,3130	C; 03130 0	C; 03131 1	CKSM 61730 1	@	@	@	@	@
32,3140	@	@	@	@	@	@	@	@
32,3150	@	@	@	@	@	@	@	@
32,3160	@	@	@	@	@	@	@	@
32,3170	@	@	@	@	@	@	@	@
32,3200	@	@	@	@	@	@	@	@
32,3210	@	@	@	@	@	@	@	@
32,3220	@	@	@	@	@	@	@	@
32,3230	@	@	@	@	@	@	@	@
32,3240	@	@	@	@	@	@	@	@
32,3250	@	@	@	@	@	@	@	@
32,3260	@	@	@	@	@	@	@	@
32,3270	@	@	@	@	@	@	@	@
32,3300	@	@	@	@	@	@	@	@
32,3310	@	@	@	@	@	@	@	@
32,3320	@	@	@	@	@	@	@	@
32,3330	@	@	@	@	@	@	@	@
32,3340	@	@	@	@	@	@	@	@
32,3350	@	@	@	@	@	@	@	@
32,3360	@	@	@	@	@	@	@	@
32,3370	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 174, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

33,2000	04161 0	C; 05022 1	C; 27000 1	37760 1	04105 1	06051 0	C; 00040 0	04117 1
33,2010	C; 00072 1	37761 0	54764 0	06067 0	C; 00001 0	00004 0	37763 1	05663 1
33,2020	C; 02023 1	C; 66064 0	15567 1	37767 0	00006 1	01006 0	00006 1	01005 0
33,2030	04161 0	C; 47012 1	C; 00144 0	C; 02037 1	C; 66064 0	05701 1	C; 00144 0	05073 0
33,2040	C; 00274 0	C; 00276 1	C; 00144 0	05101 1	C; 00004 0	C; 00144 0	05073 0	C; 00275 1
33,2050	C; 00277 0	C; 00144 0	05101 1	C; 00006 1	C; 00144 0	05101 1	C; 00005 1	C; 00144 0
33,2060	05101 1	C; 00007 0	C; 00620 0	30075 0	77747 0	00006 1	12077 1	04161 0
33,2070	C; 47012 1	C; 00062 0	C; 02063 0	C; 66064 0	05701 1	C; 00062 0	12063 1	06067 0
33,2100	C; 20000 0	00006 1	30025 0	53305 1	32613 1	54001 1	37767 0	21305 1
33,2110	00006 1	31305 0	53670 0	32614 0	56001 0	37767 0	21670 0	40075 1
33,2120	77760 0	26075 1	32615 1	00006 1	01005 0	05270 1	C; 40062 1	05101 1
33,2130	C; 00072 1	C; 00062 0	40077 0	77751 1	26077 0	05270 1	C; 40054 1	04161 0
33,2140	C; 47012 1	C; 00062 0	C; 02146 0	C; 66064 0	05701 1	C; 00062 0	05270 1	C; 40072 0
33,2150	05101 1	C; 00132 1	C; 00012 1	05270 1	C; 40046 1	04161 0	C; 47012 1	C; 00132 1
33,2160	C; 02164 0	C; 66064 0	05701 1	C; 00132 1	05101 1	C; 00073 0	C; 00144 0	05060 1
33,2170	C; 00133 0	32612 0	05663 1	C; 02351 1	C; 66064 0	04141 1	C; 40152 0	C; 05014 1
33,2200	C; 77777 0	35651 0	05516 0	C; 02206 1	C; 66064 0	15727 1	06112 0	I; 77414 0
33,2210	C; 02072 0	00006 1	31305 0	53567 0	00006 1	32654 1	52006 0	04161 0
33,2220	C; 05024 1	C; 27000 1	32661 1	55450 0	06112 0	I; 77624 1	C; 60436 0	I; 77776 1
33,2230	04161 0	C; 04024 0	06112 0	I; 77775 1	C; 01017 0	I; 53435 0	C; 01011 0	C; 26007 1
33,2240	C; 01033 0	C; 02001 1	I; 76435 1	C; 02007 1	C; 26015 1	C; 26617 0	C; 26023 1	C; 26625 1
33,2250	C; 26031 1	C; 26643 1	C; 16041 0	C; 26635 0	C; 16037 1	C; 26637 1	C; 16141 1	C; 03572 1
33,2260	C; 16057 1	C; 03436 0	C; 16375 1	C; 03440 1	C; 16045 1	C; 26633 0	C; 02061 1	I; 77614 1
33,2270	C; 02267 0	I; 50375 0	C; 02015 1	C; 01017 0	I; 77752 1	C; 26105 1	C; 02001 1	I; 72441 0
33,2300	C; 01017 0	C; 16147 1	C; 26643 1	C; 02067 1	I; 52014 0	C; 02066 0	C; 64125 0	I; 77742 0
33,2310	C; 02111 1	I; 77650 1	C; 64404 0	I; 43345 1	C; 02041 0	C; 02147 1	I; 41342 1	C; 02141 1
33,2320	I; 70415 0	C; 01047 0	I; 51025 1	C; 02375 1	C; 66330 1	I; 52014 0	C; 02271 1	C; 64125 0
33,2330	I; 52014 0	C; 02071 0	C; 64125 0	I; 43175 0	C; 02233 1	C; 02273 0	C; 25656 0	C; 26641 0
33,2340	C; 01664 1	I; 66214 0	C; 01063 0	C; 01653 0	C; 00006 1	I; 77776 1	04161 0	C; 00004 0
33,2350	15567 1	32646 1	55310 0	00006 1	32652 1	53073 0	00006 1	32650 0
33,2360	53075 0	05101 1	C; 00004 0	C; 00620 0	05270 1	C; 40066 0	05270 1	C; 40114 1
33,2370	04161 0	C; 47012 1	C; 00144 0	C; 02377 0	C; 66064 0	05701 1	C; 00144 0	05060 1

OCTAL LISTING OF PARAGRAPH # 175, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
33,2400    C; 00010 0      32606 0      05663 1    C; 02416 0    C; 66064 0      04141 1    C; 40172 1    C; 05013 0
33,2410    C; 77777 0      35642 1      05516 0    C; 02001 1    C; 70063 0      15727 1      32610 I      05663 1
33,2420    C; 02000 0    C; 60065 1     04141 1    C; 40275 0    C; 05012 1    C; 77777 0      05101 1    C; 00011 1
33,2430    C; 00622 1      05270 1    C; 40277 1      05073 0    C; 00226 1    C; 00126 1    C; 02566 0      05073 0

33,2440    C; 00344 1    C; 00304 0    C; 00144 0      05073 0    C; 00364 0    C; 00324 1    C; 01356 0      05270 1
33,2450    C; 40062 1      04161 0    C; 47012 1    C; 01356 0    C; 02460 1    C; 66064 0      05701 1    C; 01356 0
33,2460      35643 0       05505 1    C; 02465 1    C; 66064 0      15727 I      05206 0    C; 26743 0      04743 0
33,2470      00004 0       05270 1    C; 40226 0      32607 1      05663 1    C; 02506 0    C; 66064 0      04141 1

33,2500    C; 00003 1    C; 47012 1    C; 00454 1    C; 02506 0    C; 66064 0      15567 I      05270 I    C; 40066 0
33,2510      05101 1    C; 00005 1    C; 04374 0      37743 0      55323 0      00006 1      32656 0      52006 0
33,2520      04141 1    C; 00114 0    C; 47012 1    C; 00454 1    C; 02530 0    C; 66064 0      05701 1    C; 00454 1
33,2530      00006 1      32660 0      53073 0      32662 1      55450 0      04161 0    C; 00002 0      15727 I

33,2540      00004 0      32611 0      05663 1    C; 02554 1    C; 66064 0      04161 0    C; 47012 1    C; 00764 1
33,2550    C; 02554 1    C; 66064 0      05225 1    C; 60324 1      05073 0    C; 00227 0    C; 00127 0    C; 00144 0
33,2560      05270 1    C; 40054 1      04161 0    C; 47012 1    C; 01604 1    C; 02571 0    C; 66064 0      05701 1
33,2570    C; 01604 1      05073 0    C; 00365 1    C; 00325 0    C; 00144 0      05073 0    C; 00345 0    C; 00305 1

33,2600    C; 02570 1      06067 0    C; 00041 I      04161 0    C; 00002 0      15727 1    C; 00310 0    C; 00454 1
33,2610    C; 00620 0    C; 00764 1    C; 01274 1    C; 04064 1    C; 05670 0    C; 00252 1    C; 05037 0    C; 17610 0
33,2620    C; 07363 0    C; 06315 0    C; 27501 0    C; 20000 0    C; 05202 1    C; 10056 0    C; 05202 I    C; 10056 0
33,2630    C; 05202 1    C; 10056 0    C; 17146 1    C; 14632 0    C; 11773 1    C; 02555 0    C; 06065 1    C; 00000 1

33,2640    C; 20000 0    C; 00000 1    C; 00000 1    C; 00000 1    C; 00000 1    C; 00000 1    C; 02251 0    C; 02540 1
33,2650    C; 66064 0    C; 02324 0    C; 60064 0    C; 02341 0    C; 16064 1    C; 03466 0    C; 60065 1    C; 03005 1
33,2660    C; 64064 1    C; 66333 1    C; 60703 0      00006 1      22061 0      54001 1      37767 0      52145 0
33,2670      52064 1      37767 0      56146 1      54065 0      00006 1      40025 1      20145 0      37751 0

33,2700      56003 1      54062 1      00006 1      31567 1      20145 0      07327 0      30065 1      54146 0
33,2710      52064 1      52145 0      00006 1      12716 1      06000 I    C; 00404 1      56001 0      00006 1
33,2720      62714 1      22062 0      22003 1      00061 0      37753 1      04105 1      04117 1    C; 00031 0
33,2730      00006 1      30025 0      53666 1      00006 1      33502 0      21666 1      33465 0      55662 0

33,2740      04161 0    C; 05022 1    C; 20000 0      00006 1      31666 0      53567 0      00006 1      33474 0
33,2750      52006 0      04161 0    C; 04022 0      06112 0    I; 77624 1    C; 60436 0    I; 77650 1    C; 67420 0
33,2760    I; 77745 1    C; 00045 0    I; 45261 0    C; 20613 I    C; 27504 0    I; 43271 1    C; 27506 1    C; 27510 0
33,2770    C; 26264 0    C; 02272 1    C; 25656 0    C; 26641 0    C; 01664 1    I; 66214 0    C; 01063 0    C; 01653 0
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OCTAL LISTING OF PARAGRAPH # 176, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

33,3000	C; 00004 0	I; 77776 1	04161 0	C; 04022 0	00004 0	00006 1	41664 0	53670 0
33,3010	00006 1	31666 0	21670 0	33466 0	55662 0	33521 1	05663 1	C; 03036 1
33,3020	C; 66064 0	04161 0	C; 40042 0	00004 0	35642 1	05516 0	C; 02001 1	C; 70063 0
33,3030	05206 0	C; 26743 0	04743 0	04161 0	C; 00432 1	15567 1	40076 1	77751 1
33,3040	10000 0	03047 1	35660 1	05516 0	C; 03032 0	C; 66064 0	05727 0	05101 1
33,3050	C; 00354 0	C; 02260 1	05073 0	C; 00355 1	C; 00306 1	C; 00310 0	05101 1	C; 00307 0
33,3060	C; 00001 0	00006 1	40025 1	52062 1	00006 1	31670 1	20062 1	00006 1
33,3070	43500 0	20062 1	00006 1	30062 0	53305 1	52062 1	05741 0	C; 03134 1
33,3100	C; 66064 0	04161 0	C; 20134 0	33520 0	05663 1	C; 03112 0	C; 66064 0	04161 0
33,3110	C; 40452 0	15727 1	05073 0	C; 00266 0	C; 00032 0	C; 11444 0	05101 1	C; 00004 0
33,3120	C; 00764 1	05101 1	C; 00010 0	C; 00310 0	05101 1	C; 00011 1	C; 00620 0	05060 1
33,3130	C; 00033 1	04161 0	C; 00002 0	05727 0	04117 1	C; 00041 1	05470 1	C; 40277 1
33,3140	05052 0	C; 00226 1	C; 00126 1	33516 0	05663 1	C; 03450 0	C; 66064 0	35651 0
33,3150	05516 0	C; 03157 1	C; 66064 0	04141 1	C; 40472 1	C; 00154 1	15727 1	00006 1
33,3160	31670 1	53567 0	43517 0	54001 1	47767 1	21567 0	00006 1	32654 1
33,3170	52006 0	04161 0	C; 05024 1	C; 27000 1	32646 1	55310 0	00006 1	32652 1
33,3200	53073 0	00006 1	33472 0	53075 0	00004 0	43517 0	02663 0	55342 1
33,3210	05663 1	C; 02000 0	C; 60065 1	04141 1	C; 40355 0	C; 04024 0	00004 0	47767 1
33,3220	02663 0	55305 1	05663 1	C; 03230 0	C; 66062 0	04161 0	C; 40174 1	15567 1
33,3230	00006 1	33470 1	53073 0	05270 1	C; 40226 0	04141 1	C; 00004 0	C; 40512 0
33,3240	05701 1	C; 00062 0	05270 1	C; 40066 0	04161 0	C; 40532 1	05701 1	C; 00372 1
33,3250	05101 1	C; 00005 1	C; 04374 0	04141 1	C; 00002 0	C; 05014 1	C; 77777 0	37743 0
33,3260	55323 0	00006 1	32656 0	52006 0	15727 1	I; 77624 1	C; 67477 1	I; 77775 1
33,3270	C; 02272 1	C; 02233 1	I; 77624 1	C; 60703 0	I; 77776 1	05225 1	C; 60324 1	I; 45345 1
33,3300	C; 00045 0	C; 03574 1	I; 56205 0	C; 27512 1	C; 02535 0	C; 02346 1	I; 44234 1	C; 33454 1
33,3310	C; 01307 1	I; 47015 0	C; 02346 1	C; 33520 0	C; 02141 1	I; 51025 1	C; 27476 1	C; 00052 0
33,3320	I; 77776 1	00004 0	31541 0	00006 1	63347 1	55304 0	05663 1	C; 03340 0
33,3330	C; 66061 0	00006 1	32652 1	53073 0	04141 1	C; 40552 1	C; 00035 1	15567 1
33,3340	05270 1	C; 40263 1	05270 1	C; 40114 1	04161 0	C; 00002 0	15727 1	37763 1
33,3350	13325 1	00004 0	33515 0	05663 1	C; 03362 0	C; 66064 0	04161 0	C; 40572 0
33,3360	05225 1	C; 60324 1	05073 0	C; 00127 0	C; 00227 0	C; 01750 1	05073 0	C; 00365 1
33,3370	C; 00325 0	C; 00144 0	05073 0	C; 00345 0	C; 00305 1	C; 02570 1	05470 1	C; 40054 1

OCTAL LISTING OF PARAGRAPH # 177, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

33,3400	05101 1	C; 00032 0	C; 13560 0	05052 0	C; 00033 1	C; 00267 1	05126 1	C; 00001 0
33,3410	C; 00013 0	C; 01752 0	06067 0	C; 00001 0	04161 0	C; 00002 0	15727 1	06112 0
33,3420	I; 47375 0	C; 01017 0	C; 01033 0	I; 63256 0	C; 01033 0	I; 77635 1	I; 43325 1	C; 02355 0
33,3430	C; 01047 0	I; 65205 0	C; 01047 0	C; 02355 0	I; 56205 0	C; 27514 1	I; 74366 1	I; 77752 1
33,3440	C; 02324 0	I; 77651 0	C; 01017 0	C; 02332 1	I; 77656 1	C; 02272 1	I; 77650 1	C; 02262 0
33,3450	05073 0	C; 00344 1	C; 00304 0	C; 00144 0	05073 0	C; 00364 0	C; 00324 1	C; 01356 0
33,3460	05270 1	C; 40062 1	04161 0	C; 00002 0	15727 1	C; 66760 0	C; 67665 1	C; 03417 0
33,3470	C; 66064 0	C; 03351 0	C; 66064 0	C; 02336 0	C; 16064 1	C; 00000 1	C; 00620 0	C; 00000 1
33,3500	C; 14710 1	C; 00001 0	C; 35414 0	C; 00000 1	C; 00302 0	C; 22653 1	C; 21315 0	C; 00000 1
33,3510	C; 05050 1	C; 00000 1	C; 36411 0	C; 11217 0	C; 27040 0	C; 00764 1	C; 11610 0	C; 05670 0
33,3520	C; 02114 1	C; 15530 0	C; 03522 1	C; 03523 0	CKSM 62316 1	@	@	@
33,3530	@	@	@	@	@	@	@	@
33,3540	@	@	@	@	@	@	@	@
33,3550	@	@	@	@	@	@	@	@
33,3560	@	@	@	@	@	@	@	@
33,3570	@	@	@	@	@	@	@	@
33,3600	@	@	@	@	@	@	@	@
33,3610	@	@	@	@	@	@	@	@
33,3620	@	@	@	@	@	@	@	@
33,3630	@	@	@	@	@	@	@	@
33,3640	@	@	@	@	@	@	@	@
33,3650	@	@	@	@	@	@	@	@
33,3660	@	@	@	@	@	@	@	@
33,3670	@	@	@	@	@	@	@	@
33,3700	@	@	@	@	@	@	@	@
33,3710	@	@	@	@	@	@	@	@
33,3720	@	@	@	@	@	@	@	@
33,3730	@	@	@	@	@	@	@	@
33,3740	@	@	@	@	@	@	@	@
33,3750	@	@	@	@	@	@	@	@
33,3760	@	@	@	@	@	@	@	@
33,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 200, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "e" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

34,2000	12001 0	06112 0	I; 77634 0	C; 73513 1	C; 01533 0	I; 45164 0	C; 01535 0	C; 70445 0
34,2010	I; 61375 1	C; 01656 0	C; 01536 0	I; 41456 0	I; 53435 0	C; 01664 1	I; 57400 1	C; 70042 0
34,2020	C; 25624 0	C; 01664 1	I; 72441 0	I; 77726 1	I; 77624 1	C; 70564 1	I; 75160 1	C; 01535 0
34,2030	C; 01557 1	I; 77624 1	C; 73417 1	I; 45160 1	C; 00000 1	C; 70711 1	I; 77634 0	C; 33526 0
34,2040	C; 35632 0	C; 70070 1	I; 50375 0	C; 01664 1	I; 72240 1	C; 70051 1	C; 01533 0	C; 35632 0
34,2050	C; 70070 1	I; 47375 0	C; 01544 0	C; 30414 0	I; 47256 0	C; 01664 1	I; 40056 0	C; 70064 1
34,2060	C; 15624 0	C; 30414 0	I; 77650 1	C; 70024 0	I; 52175 0	C; 30414 0	C; 70060 0	06112 0
34,2070	I; 77634 0	C; 73513 1	C; 01533 0	I; 51535 0	C; 01535 0	I; 51025 1	C; 30444 0	C; 70771 1
34,2100	I; 72364 0	C; 01535 0	C; 01533 0	I; 77624 1	C; 70445 0	I; 51535 0	C; 01634 1	I; 51025 1
34,2110	C; 30444 0	C; 70771 1	I; 72364 0	C; 01557 1	C; 01632 1	I; 77624 1	C; 70445 0	I; 45160 1
34,2120	C; 01535 0	C; 73447 1	I; 77775 1	I; 77626 0	C; 52161 0	I; 77626 0	C; 52167 0	I; 77626 0
34,2130	C; 76175 0	I; 75160 1	C; 01601 1	C; 01557 1	I; 77624 1	C; 73417 1	I; 45575 1	C; 52203 1
34,2140	I; 77626 0	C; 52211 1	I; 77626 0	C; 76217 1	I; 45001 1	C; 00023 0	C; 73456 1	I; 45575 1
34,2150	C; 52161 0	I; 77626 0	C; 52167 0	I; 77626 0	C; 76175 0	I; 45345 1	C; 01604 1	C; 01562 1
34,2160	I; 45325 1	C; 01564 1	C; 01606 0	I; 45325 1	C; 01614 0	C; 01572 0	I; 77666 1	C; 01635 0
34,2170	I; 43345 1	C; 01560 0	C; 01600 0	I; 43225 0	C; 30426 1	C; 01570 1	C; 01645 1	I; 77726 1
34,2200	C; 01643 1	I; 51025 1	C; 30410 1	C; 70214 1	I; 77751 1	C; 01632 1	C; 00767 1	I; 77751 1
34,2210	C; 30416 1	C; 00775 1	C; 34772 1	C; 70761 0	I; 45345 1	C; 01643 1	C; 30412 0	I; 77744 0
34,2220	C; 70226 0	C; 01635 0	I; 77656 1	C; 01624 0	I; 77650 1	C; 71006 1	I; 53375 0	C; 01560 0
34,2230	C; 01602 1	I; 77762 1	C; 25602 1	C; 01566 0	I; 74455 0	C; 01610 1	C; 25610 1	C; 01574 0
34,2240	I; 74455 0	C; 01616 1	C; 01616 1	I; 70545 1	C; 01645 1	I; 45325 1	C; 30414 0	C; 01645 1
34,2250	I; 65204 1	C; 73501 1	C; 01622 0	I; 56225 1	C; 00001 0	C; 00003 1	I; 65366 1	C; 01612 0
34,2260	I; 56225 1	C; 00001 0	C; 00003 1	I; 65366 1	C; 01602 1	I; 56225 1	C; 00001 0	C; 00003 1
34,2270	I; 55566 1	I; 77656 1	C; 01624 0	I; 45345 1	C; 01624 0	C; 01626 1	I; 71240 1	C; 70306 0
34,2300	C; 01624 0	I; 50025 0	C; 01630 0	C; 70363 0	I; 77650 1	C; 70337 1	I; 45345 1	C; 01626 1
34,2310	C; 01630 0	I; 77640 0	C; 70363 0	I; 51145 0	C; 01637 1	C; 70321 0	I; 57575 1	C; 01624 0
34,2320	C; 01624 0	I; 51145 0	C; 01604 1	C; 70327 0	I; 57545 1	C; 01624 0	C; 01624 0	I; 51145 0
34,2330	C; 01614 0	C; 71006 1	I; 57545 1	C; 01630 0	I; 77650 1	C; 71006 1	I; 51145 0	
34,2340	C; 01635 0	C; 70345 1	I; 57575 1	C; 01624 0	C; 01624 0	I; 51145 0	C; 01604 1	C; 70353 0
34,2350	I; 57545 1	C; 01626 1	C; 01626 1	I; 51145 0	C; 01606 0	C; 71006 1	I; 57545 1	C; 01630 0
34,2360	C; 01630 0	I; 77650 1	C; 71006 1	I; 51145 0	C; 01641 0	C; 70371 0	I; 57575 1	C; 01624 0
34,2370	C; 01624 0	I; 51145 0	C; 01606 0	C; 70377 0	I; 57545 1	C; 01624 0	C; 01624 0	I; 51145 0

OCTAL LISTING OF PARAGRAPH # 201, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

34,2400	C; 01614 0	C; 71006 1	I; 57545 1	C; 01626 1	C; 01626 1	I; 77650 1	C; 71006 1	C; 00013 0	
34,2410	C; 13563 0	C; 17070 0	C; 34343 1	C; 20000 0	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1	
34,2420	C; 00000 1	C; 00000 1	C; 00000 1	C; 20000 0	C; 00000 1	C; 10000 0	C; 00000 1	C; 15666 0	
34,2430	C; 20443 0	C; 33555 1	C; 01106 1	C; 67777 1	C; 77777 0	C; 04000 0	C; 00000 1	C; 00216 1	
34,2440	C; 36323 0	C; 17773 1	C; 00057 0	C; 12525 0	C; 12525 0	I; 66370 0	C; 00003 1	C; 00051 0	
34,2450	C; 00001 0	C; 00010 0	I; 77601 0	C; 00001 0	I; 47133 0	C; 00013 0	C; 33457 1	C; 00013 0	
34,2460	I; 65356 1	C; 00013 0	I; 41546 0	I; 71300 1	C; 70454 0	C; 00007 0	I; 72405 0	C; 00013 0	
34,2470	C; 10001 1	I; 41345 0	C; 00005 1	C; 00001 0	I; 41325 0	C; 00007 0	C; 00011 1	I; 72405 0	
34,2500	C; 00003 1	I; 72421 0	C; 00015 0	C; 10003 0	I; 41345 0	C; 00003 1	C; 00005 1	I; 41325 0	
34,2510	C; 00007 0	C; 00011 1	I; 72405 0	C; 00001 0	I; 72415 1	C; 00017 1	C; 10005 0	I; 77745 1	
34,2520	C; 00011 1	C; 10007 1	I; 77745 1	C; 00013 0	I; 72405 0	C; 00003 1	C; 10011 0	I; 41345 0	
34,2530	C; 00013 0	C; 00001 0	I; 72476 1	C; 10013 1	I; 41345 0	C; 00005 1	C; 00013 0	I; 72476 1	
34,2540	C; 10015 1	I; 77745 1	I; 72405 0	C; 00011 1	I; 41325 0	C; 00007 0	C; 00001 0	I; 72415 1	
34,2550	I; 77626 0	C; 67760 1	I; 77745 1	I; 72405 0	C; 00011 1	I; 41325 0	C; 00007 0	C; 00003 1	
34,2560	I; 72425 1	I; 77626 0	C; 67756 1	I; 77616 0	I; 41401 1	C; 00001 0	I; 65356 1	I; 41546 0	
34,2570	I; 65302 0	I; 41021 1	C; 30414 0	C; 73501 1	I; 77725 1	C; 01624 0	I; 41316 0	C; 00005 1	
34,2600	I; 52415 0	C; 00003 1	I; 77604 0	C; 73501 1	C; 15560 0	C; 01626 1	I; 41316 0	C; 00005 1	
34,2610	I; 52415 0	C; 00003 1	I; 77604 0	C; 73501 1	C; 15570 1	C; 01630 0	I; 41316 0	C; 00005 1	
34,2620	I; 52415 0	C; 00003 1	I; 77604 0	C; 73501 1	C; 01600 0	I; 41345 0	C; 01624 0	C; 01626 1	
34,2630	I; 72405 0	C; 00005 1	I; 41325 0	C; 01630 0	C; 00001 0	I; 43206 1	C; 00007 0	I; 41112 0	
34,2640	C; 73501 1	C; 15566 0	I; 62421 1	I; 77604 0	C; 73501 1	C; 15562 1	C; 01624 0	I; 41205 0	
34,2650	C; 01630 0	C; 00005 1	I; 65352 0	C; 01626 1	I; 41405 0	C; 00001 0	I; 62415 0	C; 00007 0	
34,2660	I; 77604 0	C; 73501 1	C; 15564 1	I; 62421 1	I; 77604 0	C; 73501 1	C; 15574 0	C; 01626 1	
34,2670	I; 41205 0	C; 01630 0	C; 00005 1	I; 65352 0	C; 01624 0	I; 41405 0	C; 00001 0	I; 62415 0	
34,2700	C; 00007 0	I; 77604 0	C; 73501 1	C; 15576 1	I; 62421 1	I; 77604 0	C; 73501 1	C; 01572 0	
34,2710	I; 77616 0	I; 67543 1	C; 00007 0	I; 71406 0	I; 41152 1	C; 73501 1	C; 00051 0	I; 57543 1	
34,2720	C; 00015 0	I; 67471 1	C; 00051 0	I; 51123 0	C; 00001 0	C; 70737 0	I; 57545 1	I; 43244 1	
34,2730	C; 70734 0	C; 30414 0	I; 77650 1	C; 70736 1	I; 77625 0	C; 30414 0	I; 77606 1	I; 57543 1	
34,2740	C; 00013 0	I; 67471 1	C; 00051 0	I; 51123 0	C; 00011 1	C; 70757 0	I; 57545 1	I; 43244 1	
34,2750	C; 70754 0	C; 30414 0	I; 77650 1	C; 70760 1	I; 52025 1	C; 30414 0	C; 70760 1	I; 77745 1	
34,2760	I; 43466 1	I; 77776 1	37762 0	00004 0	05663 1	C; 03710 1	C; 70063 0	00003 1	
34,2770	05567 0	I; 77776 1	37762 0	00004 0	05663 1	C; 03001 0	C; 70063 0	00003 1	

OCTAL LISTING OF PARAGRAPH # 202, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
34,3000      05567 0     06076 0   C: 02000 0     36311 1     05225 1   C: 26715 0   I: 51545 1   C: 01624 0
34,3010   I: 51025 1   C: 30442 0   C: 71437 1   I: 41345 0   C: 01624 0   C: 01630 0   I: 65352 0   C: 01624 0
34,3020   I: 72405 0   C: 01626 1   I: 63525 0   C: 01624 0   I: 55552 0   C: 01602 1   I: 53476 1   C: 30414 0
34,3030   C: 15610 1   C: 01626 1   I: 65276 1   C: 01630 0   I: 55525 0   C: 30416 1   C: 25616 1   C: 01544 0

34,3040   C: 01635 0   I: 76521 0   C: 01602 1   C: 15602 1   C: 01606 0   I: 65316 0   C: 01604 1   I: 43316 1
34,3050   I: 77766 0   C: 01647 0   I: 50025 0   C: 30440 1   C: 71437 1   I: 51145 0   C: 01606 0   C: 71066 1
34,3060   I: 57575 1   C: 01635 0   C: 15635 0   C: 01647 0   I: 77676 0   C: 01647 0   I: 43345 1   C: 01602 1
34,3070   C: 01647 0   I: 51400 1   C: 71076 0   I: 50025 0   C: 30430 0   C: 71437 1   I: 70545 1   C: 01604 1

34,3100   I: 44271 0   C: 01647 0   C: 01645 1   I: 71244 0   C: 71437 1   C: 01574 0   I: 65325 0   C: 01566 0
34,3110   C: 01560 0   I: 76466 1   C: 15616 1   C: 01616 1   I: 50015 0   C: 30442 0   C: 71134 1   I: 47375 0
34,3120   C: 30414 0   C: 01616 1   I: 77656 1   C: 25560 0   C: 01616 1   I: 53455 0   C: 30414 0   I: 77650 1
34,3130   C: 71150 0   I: 52175 0   C: 30420 1   C: 71141 0   I: 47375 0   C: 30414 0   C: 01616 1   I: 40056 0

34,3140   C: 71131 1   C: 01560 0   I: 77635 1   C: 30414 0   I: 47315 0   C: 01616 1   C: 01560 0   I: 53455 0
34,3150   I: 77626 0   C: 76211 1   I: 50201 1   C: 00001 0   C: 01635 0   I: 41552 0   I: 72516 0   I: 50315 0
34,3160   C: 01560 0   C: 01635 0   I: 41552 0   I: 72516 0   I: 45325 1   C: 30436 0   C: 00007 0   I: 63406 0
34,3170   I: 41325 0   C: 01566 0   C: 30432 1   I: 62405 1   C: 00001 0   I: 63525 0   C: 01566 0   I: 44352 0

34,3200   I: 43225 0   C: 00003 1   C: 00007 0   I: 63406 0   I: 41325 0   C: 01566 0   C: 30432 1   I: 41421 0
34,3210   C: 00001 0   I: 77605 1   C: 00005 1   I: 41552 0   I: 65316 0   C: 00011 1   I: 41405 0   C: 00015 0
34,3220   I: 45221 1   C: 00025 0   C: 00013 0   I: 41366 1   C: 00023 0   I: 70525 1   C: 00017 1   I: 72525 0
34,3230   C: 00025 0   I: 77615 0   I: 70525 1   C: 00027 1   I: 41421 0   C: 00025 0   I: 56215 1   C: 00031 0

34,3240   C: 00033 1   I: 60404 1   C: 73501 1   C: 01610 1   I: 77766 0   C: 15614 0   C: 00031 0   I: 56221 0
34,3250   I: 60404 1   C: 73501 1   C: 01612 0   I: 77766 0   C: 15616 1   C: 30426 1   I: 75425 0   C: 01610 1
34,3260   C: 15620 1   C: 30426 1   I: 75425 0   C: 01612 0   C: 01622 0   I: 66370 0   C: 00004 0   C: 00051 0
34,3270   C: 00002 0   I: 71201 1   C: 00023 0   C: 00021 1   I: 65203 0   C: 01620 1   C: 01566 0   I: 40716 0

34,3300   C: 01614 0   I: 44312 1   C: 30426 1   I: 41366 1   C: 30434 1   I: 40725 0   C: 00005 1   C: 01624 0
34,3310   I: 65246 1   C: 00023 0   I: 57415 0   C: 00025 0   I: 45325 1   C: 00023 0   C: 00025 0   I: 41476 1
34,3320   I: 45246 0   C: 00027 1   I: 65246 1   C: 00031 0   I: 45246 0   C: 00027 1   I: 45246 0   I: 71644 0
34,3330   C: 71353 1   C: 00031 0   I: 71244 0   C: 71345 0   C: 00005 1   I: 70640 1   C: 71342 1   C: 01620 1

34,3340   I: 77676 0   C: 05620 0   I: 52100 1   C: 71271 0   C: 71356 1   I: 51145 0   C: 00005 1   C: 71342 1
34,3350   I: 52143 0   C: 01620 1   C: 71340 0   I: 52145 0   C: 00033 1   C: 71332 0   I: 77401 1   C: 00001 0
34,3360   C: 01624 0   I: 63241 0   C: 01560 0   C: 01624 0   I: 41441 0   C: 01566 0   I: 41370 0   C: 00000 1
34,3370   C: 01614 0   I: 41325 0   C: 01620 1   C: 00001 0   I: 51415 0   I: 41325 0   C: 00003 1   C: 01616 1
```

OCTAL LISTING OF PARAGRAPH # 203, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

34,3400	I: 41325 0	C: 00001 0	C: 01622 0	I: 51415 0	I: 77625 0	I: 74040 0	C: 71410 1	C: 00002 0
34,3410	I: 74343 0	C: 01620 1	C: 01560 0	I: 74323 0	C: 01614 0	C: 01566 0	I: 77655 1	I: 77656 1
34,3420	C: 01624 0	I: 63545 0	C: 01624 0	I: 44352 0	C: 30414 0	I: 63525 0	C: 01566 0	I: 56221 0
34,3430	C: 30426 1	I: 75542 0	I: 72536 1	C: 01643 1	I: 77614 1	C: 01221 1	C: 71441 0	I: 77614 1
34,3440	C: 01061 1	I: 70740 0	C: 01652 1	C: 31465 1	I: 45002 1	C: 70564 1	I: 74343 0	C: 31465 1
34,3450	C: 01624 0	C: 15635 0	C: 01643 1	I: 55605 1	C: 31475 0	C: 31465 1	I: 77661 0	C: 20606 0
34,3460	C: 01645 1	I: 77614 1	C: 01022 0	C: 71477 0	C: 00554 0	C: 02660 0	C: 02660 0	C: 13301 1
34,3470	C: 07070 1	C: 34344 0	C: 16161 0	C: 50707 1	C: 00003 1	C: 04000 0	06112 0	I: 75160 1
34,3500	C: 01535 0	C: 01557 1	I: 77624 1	C: 73417 1	I: 45575 1	C: 52225 0	I: 77626 0	C: 52233 1
34,3510	I: 77626 0	C: 76241 1	I: 45160 1	C: 01535 0	C: 70711 1	I: 77634 0	C: 33526 0	C: 01602 1
34,3520	I: 77414 0	C: 01202 0	C: 71602 0	37762 0	55653 1	51653 0	31532 1	00006 1
34,3530	51653 0	21601 0	00006 1	73601 1	10000 0	67763 1	13540 1	40000 0
34,3540	51653 0	54771 1	51653 0	31601 1	51653 0	57532 1	51653 0	54766 1
34,3550	11653 1	13524 0	00006 1	40025 1	53606 1	00006 1	31645 1	21606 1
34,3560	11605 1	13642 0	13564 1	13640 1	11606 1	13642 0	13570 1	40000 0
34,3570	63631 0	00006 1	63640 0	00004 0	05663 1	C: 03666 1	C: 70063 0	00003 1
34,3600	15567 1	C: 03146 1	I: 77776 1	00006 1	30025 0	21645 0	00006 1	43637 1
34,3610	21645 0	00004 0	31634 1	54774 1	31636 0	54775 0	31640 1	54776 0
34,3620	00006 1	30034 0	52770 0	30032 0	54766 1	05270 1	C: 40046 1	00003 1
34,3630	30025 0	63637 0	57604 1	06060 1	C: 02000 0	13523 1	C: 00000 1	C: 00144 0
34,3640	37763 1	13573 1	40025 1	61604 1	10000 0	67763 1	13651 1	67745 0
34,3650	40000 0	00004 0	05663 1	C: 03661 0	C: 70063 0	00003 1	33037 0	27604 0
34,3660	15567 1	35655 1	05516 0	C: 03476 1	C: 70063 0	05727 0	37767 0	54773 0
34,3670	54776 0	54772 1	54775 0	31633 0	54770 0	31632 1	54767 0	30076 0
34,3700	77746 1	00006 1	13714 1	31631 1	54766 1	37767 0	54774 1	54771 1
34,3710	06076 0	C: 02000 0	05225 1	C: 73520 1	30076 0	77750 0	00006 1	13721 1
34,3720	13705 1	31631 1	00006 1	20766 1	00006 1	63735 0	54001 1	33754 1
34,3730	54774 1	43755 1	67763 1	54771 1	13743 0	40000 0	54001 1	43754 0
34,3740	54774 1	33755 0	54771 1	30001 0	00006 1	73756 1	00006 1	63703 0
34,3750	05663 1	C: 03703 0	C: 70063 0	05727 0	C: 01320 1	C: 00022 1	C: 21616 0	C: 03757 1
34,3760	C: 03760 0	LKSM 76260 1	@	@	@	@	@	@
34,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 204, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

35,2000	00004 0	52071 0	35210 1	05505 1	C; 02011 0	C; 72060 1	52071 0	00003 1
35,2010	52006 0	05206 0	C; 13403 1	15567 1	04161 0	C; 00075 0	37763 1	04105 1
35,2020	00004 0	30025 0	55745 1	47767 1	54037 1	54040 1	54041 0	54404 0
35,2030	54406 1	54410 0	00003 1	02773 0	33315 0	55777 0	33316 0	05206 0
35,2040	C; 51245 0	06112 0	I; 77775 1	C; 33310 0	C; 02601 1	I; 77776 1	11742 0	02051 1
35,2050	02720 0	31527 0	55746 1	37763 1	54764 0	04117 1	C; 00002 0	05206 0
35,2060	C; 25606 0	02770 0	30025 0	57745 0	55743 1	31664 1	55716 1	04161 0
35,2070	C; 00115 1	31716 0	55664 0	10000 0	30000 1	55665 1	40000 0	55664 0
35,2100	30037 0	54403 1	30040 0	54405 1	30041 1	54407 0	33334 0	04246 0
35,2110	C; 00005 1	47767 1	54037 1	54040 1	54041 0	37746 0	05516 0	C; 02122 1
35,2120	C; 72065 1	05727 0	03004 0	04161 0	C; 00215 1	12127 0	03025 0	11742 0
35,2130	02132 0	02156 1	03371 1	05206 0	C; 25222 1	41745 1	61743 0	00006 1
35,2140	62143 0	67744 1	67744 1	54147 1	06112 0	I; 42535 1	C; 00150 0	I; 51515 1
35,2150	C; 00404 1	I; 77671 1	I; 50015 0	C; 01765 1	C; 73401 0	I; 77776 1	00006 1	33306 1
35,2160	50110 1	52051 1	11742 0	02203 1	06112 0	I; 50135 0	C; 02666 0	C; 72204 1
35,2170	I; 72174 0	C; 00014 1	C; 02600 0	I; 62143 0	C; 33300 1	C; 77775 1	C; 12701 1	I; 66104 1
35,2200	C; 72173 1	C; 02600 0	I; 77776 1	06112 0	I; 61375 1	C; 00404 1	C; 02750 1	I; 77772 0
35,2210	I; 57545 1	C; 00150 0	C; 16657 1	C; 00152 1	C; 02663 0	I; 76001 1	C; 00001 0	C; 00010 0
35,2220	I; 57535 0	C; 02743 0	I; 77640 0	C; 72532 0	I; 41343 0	C; 02667 1	C; 33321 1	I; 42661 0
35,2230	C; 21212 0	C; 02715 0	I; 64623 1	C; 02635 0	C; 02655 0	I; 41223 1	C; 02627 0	C; 33323 0
35,2240	I; 77732 1	I; 45415 0	C; 71062 0	C; 06717 0	I; 77743 1	C; 02655 0	C; 06627 1	I; 77745 1
35,2250	C; 33304 0	C; 06635 1	I; 77100 0	C; 72224 0	C; 00004 0	I; 56743 1	C; 75170 0	C; 75104 0
35,2260	C; 12607 0	I; 77104 1	C; 72255 0	C; 00010 0	I; 66140 1	C; 02601 1	C; 02601 1	I; 56743 1
35,2270	C; 02604 1	C; 75062 1	I; 77613 0	C; 75142 1	C; 12635 1	I; 42743 1	C; 75160 1	C; 75074 0
35,2300	C; 12617 1	I; 42673 0	C; 75062 1	C; 75132 0	C; 12645 0	I; 40743 0	C; 33326 0	C; 75062 1
35,2310	I; 42772 0	C; 75122 1	C; 12655 1	I; 76104 0	C; 72264 1	C; 00010 0	I; 64743 0	C; 02657 1
35,2320	C; 02635 0	I; 55523 0	C; 02665 0	I; 76521 0	C; 02721 1	I; 77745 1	C; 00145 1	C; 06665 1
35,2330	I; 77745 1	C; 00150 0	C; 06655 1	I; 77745 1	C; 00152 1	C; 06657 0	I; 77700 0	C; 72316 0
35,2340	I; 76174 1	C; 00006 1	C; 00002 0	I; 57343 1	C; 02637 1	C; 33331 0	I; 77722 0	I; 73406 1
35,2350	I; 56172 0	C; 00046 0	C; 10021 0	I; 77745 1	I; 77746 1	C; 10027 0	I; 71304 0	C; 72343 0
35,2360	C; 00017 1	I; 43312 0	C; 02625 1	C; 16625 1	C; 00015 0	I; 56405 0	C; 00025 0	I; 77615 0
35,2370	C; 02631 1	C; 16631 1	C; 00021 1	I; 57475 0	C; 00023 0	C; 00017 1	I; 77712 0	I; 57325 1

OCTAL LISTING OF PARAGRAPH # 205, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

35,2400	C; 00013 0	C; 00015 0	I; 77615 0	I; 77675 0	C; 02573 1	I; 57325 1	C; 00023 0	C; 00025 0
35,2410	I; 66405 0	C; 02571 0	I; 77621 1	C; 02637 1	I; 45425 0	C; 61156 1	C; 00021 1	I; 41475 1
35,2420	C; 00025 0	C; 02573 1	I; 77732 1	I; 57325 1	C; 02571 0	C; 00017 1	I; 77615 0	C; 02641 0
35,2430	I; 77625 0	I; 57325 1	C; 02575 1	C; 02573 1	I; 45415 0	C; 61062 1	C; 00023 0	I; 76405 1
35,2440	C; 00013 0	I; 57325 1	C; 00015 0	C; 00021 1	I; 76405 1	C; 00017 1	I; 77621 1	I; 77675 0
35,2450	C; 02573 1	I; 57325 1	C; 00015 0	C; 00025 0	I; 76405 1	C; 02571 0	I; 77621 1	C; 02577 0
35,2460	I; 77615 0	I; 77606 1	I; 74475 1	C; 00015 0	I; 57325 1	C; 02621 0	C; 00023 0	I; 77615 0
35,2470	I; 77671 1	C; 00025 0	I; 57206 1	C; 33333 1	I; 43261 0	C; 21616 0	C; 02635 0	C; 16635 0
35,2500	I; 43275 0	C; 00017 1	C; 02715 0	I; 54275 0	C; 33333 1	C; 21616 0	I; 77615 0	C; 02633 0
35,2510	C; 16633 0	C; 00023 0	I; 76405 1	I; 57325 1	C; 00015 0	C; 02621 0	I; 77621 1	I; 54275 0
35,2520	C; 33333 1	C; 21616 0	I; 77615 0	C; 02627 0	C; 02627 0	I; 77404 1	C; 72750 0	11527 1
35,2530	02717 1	02664 1	I; 44743 1	C; 02667 1	C; 02655 0	I; 42675 0	C; 33336 1	C; 02655 0
35,2540	C; 06655 1	I; 77613 0	C; 02657 1	C; 06657 0	I; 42675 0	C; 33340 0	C; 02655 0	I; 41475 1
35,2550	C; 33336 1	I; 67300 0	C; 72532 0	C; 02747 1	I; 71254 1	C; 72566 1	C; 02627 0	I; 45425 0
35,2560	C; 61150 1	I; 77621 1	C; 02631 1	C; 02631 1	I; 77650 1	C; 72610 0	I; 43345 1	C; 02625 1
35,2570	C; 02645 1	C; 16625 1	C; 02645 1	I; 44275 1	C; 33342 1	C; 02631 1	C; 16631 1	C; 02651 1
35,2600	I; 44275 1	C; 33342 1	C; 02627 0	I; 41325 0	C; 02653 0	C; 33344 1	I; 45421 1	C; 75150 1
35,2610	I; 77775 1	C; 02625 1	C; 03564 0	I; 77776 1	11527 1	02717 1	10356 0	12772 0
35,2620	03371 1	06112 0	I; 77775 1	C; 02772 1	C; 16617 0	C; 02565 0	C; 02603 0	I; 77776 1
35,2630	04161 0	C; 00255 0	06112 0	I; 64375 1	C; 02625 1	C; 02750 1	I; 53372 1	C; 02617 0
35,2640	C; 16772 1	C; 02603 0	C; 02565 0	I; 77776 1	05206 0	C; 30424 0	31746 0	55716 1
35,2650	12757 1	00004 0	04133 1	C; 00011 1	02656 0	15567 1	04117 1	C; 00007 0
35,2660	37767 0	04246 0	C; 00003 1	15567 1	06112 0	I; 65345 0	C; 02627 0	C; 02633 0
35,2670	I; 55525 0	C; 02635 0	I; 74276 1	C; 33331 0	I; 74521 1	C; 02750 1	C; 02501 1	I; 77776 1
35,2700	04161 0	C; 00175 1	33317 1	05206 0	C; 26362 1	05206 0	C; 26751 0	02753 1
35,2710	11574 1	02715 0	02773 0	05206 0	C; 50102 1	05206 0	C; 50230 0	55527 1
35,2720	04161 0	C; 00135 0	11574 1	02725 0	02727 1	05206 0	C; 30424 0	03371 1
35,2730	00004 0	40025 1	61745 0	00006 1	62736 1	67745 0	61744 1	00006 1
35,2740	62746 0	05663 1	C; 02062 1	C; 72065 1	00003 1	05567 0	37762 0	02741 1
35,2750	04755 1	C; 01600 0	02755 1	04755 1	C; 01601 1	05206 0	C; 30770 1	04161 0
35,2760	C; 00155 0	06112 0	I; 77775 1	C; 33300 1	C; 02625 1	I; 77776 1	11716 1	55746 1
35,2770	34530 0	55527 1	02720 0	00006 1	23547 0	06112 0	I; 77624 1	C; 30407 1

OCTAL LISTING OF PARAGRAPH # 206, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

35,3000	I; 77776 1	05206 0	C; 30752 1	01547 0	35352 0	54001 1	33315 0	54144 1
35,3010	50144 0	31600 0	22003 1	50144 0	55600 1	22003 1	10144 1	13021 0
35,3020	00002 0	54144 1	35352 0	54001 1	13010 1	33315 0	54144 1	35352 0
35,3030	56003 1	54001 1	50144 0	31600 0	22003 1	50144 0	55600 1	10144 1
35,3040	13042 0	00002 0	54144 1	13027 0	00006 1	23547 0	33346 0	54144 1
35,3050	50000 1	31720 0	50144 0	55400 0	10144 1	13047 0	01547 0	C; 77743 1
35,3060	C; 77776 1	C; 35143 1	C; 10237 0	C; 31766 1	C; 26106 1	C; 77772 0	C; 43677 0	C; 77777 0
35,3070	C; 77661 0	C; 00002 0	C; 05420 1	C; 77705 0	C; 77776 1	C; 37560 0	C; 05346 0	C; 37522 0
35,3100	C; 15525 1	C; 77763 0	C; 41604 0	C; 77777 0	C; 76470 0	C; 00007 0	C; 02201 0	C; 77767 1
35,3110	C; 77776 1	C; 37773 0	C; 10042 0	C; 37747 1	C; 30232 1	C; 00006 1	C; 37666 0	C; 77777 0
35,3120	C; 76703 1	C; 00001 0	C; 36147 0	C; 77635 1	C; 77776 1	C; 37666 0	C; 11022 1	C; 37532 1
35,3130	C; 33647 1	C; 00007 0	C; 03641 1	C; 77777 0	C; 75713 0	C; 77774 0	C; 54605 0	C; 77407 1
35,3140	C; 77776 1	C; 37712 1	C; 16755 1	C; 37630 0	C; 01160 1	C; 00000 1	C; 23600 0	C; 77777 0
35,3150	C; 63663 1	C; 77777 0	C; 56527 1	C; 77655 0	C; 77776 1	C; 37763 1	C; 23341 0	C; 37755 1
35,3160	C; 26170 0	C; 00000 1	C; 00254 1	C; 77777 0	C; 52755 1	C; 77777 0	C; 76764 0	C; 77147 0
35,3170	C; 77776 1	C; 37772 1	C; 02343 1	C; 37764 0	C; 30560 1	C; 00000 1	C; 00362 0	C; 00000 1
35,3200	C; 17261 1	C; 77777 0	C; 77671 1	C; 77015 0	C; 77776 1	C; 37765 1	C; 12403 0	C; 37752 0
35,3210	C; 20062 1	C; 00000 1	C; 00224 0	C; 00000 1	C; 06150 0	C; 77777 0	C; 77762 1	C; 77161 1
35,3220	C; 77776 1	C; 37767 0	C; 12513 0	C; 37756 1	C; 30343 0	C; 00000 1	C; 00060 1	C; 00000 1
35,3230	C; 01445 0	C; 77777 0	C; 77774 0	C; 76651 1	C; 77776 1	C; 37771 1	C; 02603 0	C; 37762 0
35,3240	C; 10061 1	C; 00000 1	C; 00023 0	C; 00000 1	C; 00402 1	C; 00000 1	C; 00000 1	C; 76505 0
35,3250	C; 77776 1	C; 37772 1	C; 22005 1	C; 37765 1	C; 05560 1	C; 00000 1	C; 00005 1	C; 00000 1
35,3260	C; 00113 1	C; 00000 1	C; 00000 1	C; 76651 1	C; 77776 1	C; 37773 0	C; 20150 1	C; 37767 0
35,3270	C; 03044 1	C; 00000 1	C; 00003 1	C; 00000 1	C; 00033 1	C; 00000 1	C; 00000 1	C; 00000 1
35,3300	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1	C; 00000 1	C; 00004 0	C; 00002 0	C; 00220 1
35,3310	C; 77776 1	C; 35730 0	C; 00035 1	C; 10317 0	C; 17550 1	C; 00115 1	C; 01577 0	C; 02500 0
35,3320	C; 04133 1	C; 02265 1	C; 37223 0	C; 66451 1	C; 05427 0	C; 12577 1	C; 77767 0	C; 44202 1
35,3330	C; 24276 1	C; 14066 1	C; 23073 1	C; 11773 1	C; 00023 0	C; 03146 1	C; 14632 0	C; 00121 0
35,3340	C; 35341 1	C; 00631 0	C; 23146 0	C; 00000 1	C; 17565 1	C; 06200 0	C; 00021 1	C; 00023 0
35,3350	C; 00062 0	37763 1	55742 0	04117 1	C; 00001 0	33345 0	54765 1	37764 0
35,3360	55544 1	37754 0	55527 1	33350 1	55744 0	37767 0	55536 1	05206 0
35,3370	C; 50014 1	30075 0	77762 1	10000 0	13376 1	00002 0	04117 1	C; 00004 0

OCTAL LISTING OF PARAGRAPH # 207, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "e" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

35,3400	12621 1	I: 77214 0	C: 00475 1	C: 00404 1	C: 01765 1	I: 77531 0	C: 01743 0	C: 00012 1
35,3410	00004 0	35205 0	05663 1	C: 02446 0	C: 56065 1	00003 1	13376 1	I: 77601 0
35,3420	C: 00001 0	I: 64743 0	C: 77762 1	C: 77770 1	I: 55523 0	C: 77776 1	I: 64717 1	C: 00001 0
35,3430	C: 77760 0	I: 64723 0	C: 77766 0	C: 77774 0	I: 63666 1	C: 00001 0	I: 64723 0	C: 77756 0
35,3440	C: 77764 1	I: 55523 0	C: 77772 0	I: 41517 1	C: 00001 0	I: 77650 1	C: 73456 1	I: 76601 1
35,3450	C: 00001 0	C: 00001 0	I: 62713 0	C: 00007 0	C: 00015 0	I: 77606 1	I: 65345 0	C: 00003 1
35,3460	C: 00007 0	C: 14003 1	I: 77626 0	C: 63770 1	C: 00005 1	I: 77725 1	C: 00015 0	C: 14005 1
35,3470	I: 77626 0	C: 63762 1	C: 00013 0	I: 77725 1	C: 00017 1	C: 14013 0	I: 77626 0	C: 77760 0
35,3500	I: 77616 0	00006 1	37743 0	52145 0	10000 0	37767 0	16544 0	13510 1
35,3510	00006 1	47743 1	16542 0	30034 0	54146 0	00006 1	30033 1	16554 1
35,3520	37762 0	55653 1	50000 1	30766 0	00006 1	51653 0	20032 1	10000 0
35,3530	63545 0	13533 0	63545 0	00006 1	63540 0	04755 1	C: 01412 1	13542 0
35,3540	11653 1	13521 0	36311 1	05225 1	C: 26720 0	C: 77070 0	00004 0	40025 1
35,3550	63513 0	67746 0	67746 0	56061 0	30061 0	05663 1	C: 03576 0	C: 72060 1
35,3560	40025 1	63575 0	67746 0	67746 0	56061 0	30061 0	05663 1	C: 03603 1
35,3570	C: 72060 1	05567 0	C: 00000 1	C: 01130 1	C: 00000 1	C: 00310 0	35641 1	05516 0
35,3600	C: 77777 0	C: 77777 0	05727 0	37746 0	05516 0	C: 77777 0	C: 77777 0	05727 0
35,3610	C: 03610 0	C: 03611 1	CKSM 77053 1	e	e	e	e	e
35,3620	e	e	e	e	e	e	e	e
35,3630	e	e	e	e	e	e	e	e
35,3640	e	e	e	e	e	e	e	e
35,3650	e	e	e	e	e	e	e	e
35,3660	e	e	e	e	e	e	e	e
35,3670	e	e	e	e	e	e	e	e
35,3700	e	e	e	e	e	e	e	e
35,3710	e	e	e	e	e	e	e	e
35,3720	e	e	e	e	e	e	e	e
35,3730	e	e	e	e	e	e	e	e
35,3740	e	e	e	e	e	e	e	e
35,3750	e	e	e	e	e	e	e	e
35,3760	e	e	e	e	e	e	e	e
35,3770	e	e	e	e	e	e	e	e

OCTAL LISTING OF PARAGRAPH # 210, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

36,2000	37751 0	04105 1	00006 1	30025 0	53305 1	04117 1	C; 00032 0	32465 1	
36,2010	00004 0	05663 1	C; 02545 1	C; 74064 0	04141 1	C; 40253 1	C; 00312 1	00006 1	
36,2020	31305 0	53567 0	00006 1	32517 0	21567 0	00006 1	32542 0	52006 0	
36,2030	04161 0	C; 00332 0	00006 1	32534 1	52006 0	00004 0	00006 1	31457 0	
36,2040	52145 0	42520 0	54001 1	37767 0	54146 0	20145 0	00006 1	40025 1	
36,2050	20145 0	07327 0	00006 1	30145 1	53305 1	52145 0	05741 0	C; 02120 0	
36,2060	C; 74064 0	04161 0	C; 20022 0	06112 0	I; 77775 1	C; 01011 0	C; 26115 0	C; 01017 0	
36,2070	C; 16123 0	C; 35646 0	C; 15664 1	C; 35273 1	C; 01666 0	C; 15670 1	C; 01307 1	C; 02264 0	
36,2100	I; 43131 0	C; 01653 0	C; 00004 0	C; 01063 0	I; 77776 1	35642 1	00004 0	05516 0	
36,2110	C; 02001 1	C; 70063 0	05206 0	C; 26743 0	04743 0	04161 0	C; 00352 0	05567 0	
36,2120	37751 0	70076 1	10000 0	02450 1	04117 1	C; 00042 1	32530 0	55310 0	
36,2130	00006 1	32544 0	53073 0	00006 1	32540 1	53075 0	40025 1	61664 1	
36,2140	10000 0	67763 1	12147 0	66153 0	67771 1	40000 0	12140 1	55342 1	
36,2150	05663 1	C; 02000 0	C; 60065 1	04141 1	C; 40355 0	C; 00212 0	05270 1	C; 40277 1	
36,2160	05101 1	C; 00226 1	C; 01750 1	05101 1	C; 00126 1	C; 00620 0	05073 0	C; 00344 1	
36,2170	C; 00304 0	C; 00144 0	05073 0	C; 00364 0	C; 00324 1	C; 01356 0	05470 1	C; 40062 1	
36,2200	37763 1	05663 1	C; 02362 1	C; 74064 0	04141 1	C; 40033 0	C; 40232 0	05701 1	
36,2210	C; 01356 0	05270 1	C; 40226 0	04161 0	C; 47012 1	C; 00062 0	C; 02222 1	C; 74064 0	
36,2220	05701 1	C; 00062 0	05270 1	C; 40066 0	04161 0	C; 47012 1	C; 04766 1	C; 02233 1	
36,2230	C; 74064 0	05701 1	C; 04766 1	37743 0	55323 0	00006 1	32536 0	52006 0	
36,2240	00006 1	32532 1	53073 0	31345 1	00006 1	62253 1	05663 1	C; 02273 0	
36,2250	C; 74067 0	04161 0	C; 40116 0	04141 1	C; 00002 0	C; 00114 0	05727 0	00006 1	
36,2260	32544 0	53073 0	04161 0	C; 45022 0	C; 20000 0	37763 1	00004 0	05663 1	
36,2270	C; 02300 0	C; 74064 0	15567 1	35210 1	05505 1	C; 02530 0	C; 22067 0	15727 1	
36,2300	04117 1	C; 00044 1	04161 0	C; 05012 1	C; 77777 0	37761 0	55342 1	50000 1	
36,2310	32523 1	55323 0	00006 1	32536 0	52006 0	47762 1	61342 0	00006 1	
36,2320	12604 0	04141 1	C; 00114 0	C; 00372 1	31342 0	55662 0	04161 0	C; 40412 1	
36,2330	05701 1	C; 01750 1	11662 0	02306 0	37743 0	55323 0	00006 1	32536 0	
36,2340	52006 0	32465 1	05663 1	C; 02354 1	C; 74064 0	04141 1	C; 00114 0	C; 47012 1	
36,2350	C; 00144 0	C; 02354 1	C; 74064 0	05727 0	05101 1	C; 00046 0	C; 00144 0	05060 1	
36,2360	C; 00026 0	05727 0	37762 0	00006 1	02030 0	00006 1	12374 1	40025 1	
36,2370	55117 0	05701 1	C; 00062 0	12362 0	00006 1	32544 0	53073 0	05270 1	

OCTAL LISTING OF PARAGRAPH # 211, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

```
36,2400    C; 40066 0      04141 1    C; 00001 0    C; 00003 1      04141 1    C; 00004 0    C; 00006 1      04161 0
36,2410    C; 00252 1      35660 1      05505 1     C; 02354 1    C; 02063 0      05727 0      05270 1    C; 40114 1
36,2420      04117 1    C; 00074 1      35662 0       54003 0      00006 1      31777 1      53321 1      37751 0
36,2430      54003 0      05270 1    C; 40175 0      04161 0    C; 47012 1    C; 00144 0    C; 02442 1    C; 74064 0

36,2440      05701 1    C; 00144 0      05101 1    C; 00227 0    C; 00620 0      05270 1    C; 40263 1      05727 0
36,2450      05270 1    C; 57334 1      32465 1      00004 0      05663 1    C; 02463 1    C; 74064 0      04141 1
36,2460    C; 00035 1    C; 40272 1      05567 0      05101 1    C; 00047 1    C; 00144 0      05101 1    C; 00267 1
36,2470    C; 01440 0      05073 0    C; 00365 1    C; 00325 0    C; 00144 0      05073 0    C; 00345 0    C; 00305 1

36,2500    C; 03554 0      06067 0    C; 00001 0      05270 1    C; 40054 1      04141 1    C; 00002 0    C; 05013 0
36,2510    C; 77777 0      05126 1    C; 00002 0    C; 00015 0    C; 01753 1      05727 0    C; 00000 1    C; 32674 1
36,2520    C; 04312 0    C; 04766 1    C; 04230 1    C; 06815 0    C; 14632 0    C; 11463 0    C; 20000 0    C; 03146 1
36,2530    C; 02251 0    C; 02043 1    C; 44064 0    C; 02000 0    C; 44064 0    C; 03466 0    C; 60065 1    C; 02452 0

36,2540    C; 74064 0    C; 02336 0    C; 16064 1    C; 02324 0    C; 60065 1      05060 1    C; 00354 0      04161 0
36,2550    C; 40153 1      05701 1    C; 02260 1      05052 0    C; 00355 1    C; 00306 1      04161 0    C; 40173 0
36,2560      05701 1    C; 00310 0      05060 1    C; 00307 0      04161 0    C; 40213 0      05701 1    C; 00144 0
36,2570      05052 0    C; 00266 0    C; 00032 0      04161 0    C; 40233 1      05701 1    C; 13560 0      05060 1

36,2600    C; 00033 1      04161 0    C; 00003 1      05727 0      04141 1    C; 00114 0    C; 47012 1    C; 00310 0
36,2610    C; 02614 0    C; 74064 0      05701 1    C; 00310 0      05101 1    C; 00336 1    C; 00310 0      05101 1
36,2620    C; 00337 0    C; 01130 1      31342 0      55662 0      12332 0    I; 40214 1    C; 02062 1    C; 00001 0
36,2630    I; 43014 0    C; 02265 1    C; 02261 0    I; 43014 0    C; 02265 1    C; 02264 0    I; 51145 0    C; 03622 1

36,2640    C; 74643 0    I; 77614 1    C; 02064 1    I; 77614 1    C; 02303 0    C; 74653 1    I; 77745 1    C; 35644 1
36,2650    C; 01725 0    I; 77650 1    C; 74656 1    I; 77745 1    C; 35640 0    C; 01725 0    I; 41345 0    C; 02143 0
36,2660    C; 35670 0    I; 77652 0    C; 25672 0    C; 03614 1    I; 77702 1    C; 35707 1    C; 75112 1    I; 77624 1
36,2670    C; 75133 1    I; 60345 0    C; 00045 0    C; 00047 1    I; 53665 1    C; 00041 1    C; 20172 1    C; 14037 0

36,2700    C; 35646 0    I; 70425 0    C; 00035 1    C; 00025 0    I; 65301 0    C; 00047 1    C; 00037 0    I; 77671 1
36,2710    I; 75457 0    C; 20175 0    I; 44214 0    C; 02345 1    C; 75061 1    C; 00021 1    I; 51406 1    I; 44205 0
36,2720    C; 35656 1    I; 77626 0    C; 63744 0    C; 00031 0    I; 77742 0    C; 00023 0    I; 65301 0    C; 00047 1
36,2730    C; 00035 1    I; 45261 0    C; 20067 1    C; 00037 0    C; 00037 0    I; 56214 0    C; 02304 1    C; 74750 0

36,2740    I; 40057 1    C; 20201 0    C; 74750 0    I; 51406 1    I; 43205 1    C; 35656 1    I; 77650 1    C; 74753 0
36,2750    I; 71201 1    C; 00001 0    C; 35666 1    C; 00027 1    I; 71214 0    C; 02343 1    C; 75041 0    C; 01674 0
36,2760    I; 45214 1    C; 02305 0    C; 74774 0    C; 00027 1    I; 71244 0    C; 74772 0    C; 00027 1    C; 01674 0
36,2770    I; 77650 1    C; 74774 0    I; 77745 1    C; 01674 0    C; 01723 0    I; 45205 1    C; 00023 0    C; 00037 0
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OCTAL LISTING OF PARAGRAPH # 212, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

36,3000	I; 55301 0	C; 00047 1	C; 00025 0	I; 40057 1	C; 20172 1	C; 75107 0	C; 34043 1	C; 75146 0
36,3010	I; 77624 1	C; 75163 1	I; 77624 1	C; 75346 1	I; 77624 1	C; 75414 1	C; 01727 1	I; 77621 1
36,3020	C; 01672 0	C; 01733 1	I; 45246 0	C; 35672 1	I; 45040 1	C; 75046 1	C; 75513 1	I; 45246 0
36,3030	C; 35650 1	I; 71240 1	C; 75056 0	C; 01727 1	C; 15731 0	C; 01735 1	I; 52015 1	C; 01723 0
36,3040	C; 74774 0	I; 65342 1	C; 00033 1	I; 43342 0	I; 77650 1	C; 74774 0	I; 77745 1	C; 01723 0
36,3050	C; 01674 0	C; 34023 1	C; 75602 1	I; 77414 0	C; 02061 1	15567 1	I; 52014 0	C; 02060 0
36,3060	C; 75046 1	I; 43206 1	C; 00021 1	I; 51406 1	I; 44205 0	C; 35656 1	I; 77626 0	C; 63744 0
36,3070	C; 00035 1	I; 45261 0	C; 20607 1	C; 00037 0	C; 14037 0	C; 00031 0	I; 77742 0	C; 14023 0
36,3100	C; 00021 1	I; 41425 1	I; 41246 1	C; 35656 1	I; 77615 0	I; 77650 1	C; 74753 0	I; 52145 0
36,3110	C; 35273 1	C; 75016 1	I; 53575 0	C; 01707 0	C; 15701 0	C; 00045 0	C; 24041 1	C; 02365 0
36,3120	I; 77702 1	I; 41456 0	I; 72441 0	C; 01701 0	C; 24035 1	C; 01701 0	I; 76435 1	I; 75246 0
36,3130	C; 03622 1	C; 00031 0	I; 77616 0	I; 60254 1	C; 75144 1	C; 00047 1	I; 70525 1	C; 00035 1
36,3140	I; 56215 1	C; 35644 1	I; 77657 0	C; 20175 0	C; 00021 1	I; 77616 0	I; 63545 0	C; 01723 0
36,3150	I; 60215 1	C; 35636 1	C; 00047 1	I; 53605 1	C; 00043 0	C; 20573 1	I; 40021 0	C; 35642 1
36,3160	C; 75107 0	C; 00017 1	I; 77616 0	I; 45345 1	C; 00021 1	C; 01723 0	C; 00045 0	I; 60316 0
36,3170	C; 00047 1	I; 70405 1	C; 00043 0	I; 51525 1	C; 00017 1	I; 55301 0	C; 00051 0	I; 53660 1
36,3200	C; 00050 1	C; 20604 1	I; 77600 1	C; 75343 1	I; 75206 1	C; 00017 1	I; 60215 1	C; 35636 1
36,3210	C; 00047 1	I; 65265 0	C; 35644 1	C; 00001 0	I; 60366 1	C; 00050 1	I; 75205 1	C; 00003 1
36,3220	C; 00045 0	I; 43064 1	C; 00046 0	C; 02305 0	C; 75250 1	I; 65257 1	C; 57173 0	I; 40057 1
36,3230	C; 20171 1	C; 75245 0	I; 57406 1	I; 65415 1	C; 35646 0	I; 41365 1	C; 00045 0	C; 05740 1
36,3240	I; 43244 1	C; 75243 0	C; 05740 1	C; 00001 0	I; 77616 0	I; 52145 0	C; 35652 0	C; 75232 0
36,3250	I; 57457 0	C; 57162 0	I; 77725 1	I; 41457 1	C; 20160 1	I; 43276 0	C; 35636 1	I; 65342 1
36,3260	C; 00003 1	I; 43342 0	I; 44301 0	C; 01676 1	C; 35646 0	I; 77776 1	34570 1	27675 0
36,3270	01714 1	C; 00011 1	C; 00000 1	C; 00000 1	C; 00400 0	C; 00000 1	C; 00400 0	C; 00000 1
36,3300	C; 00525 0	C; 12525 0	C; 01000 0	C; 00000 1	C; 01463 1	C; 06315 0	C; 02525 1	C; 12525 0
36,3310	C; 04444 1	C; 22222 0	C; 10000 0	C; 00000 1	C; 16161 0	C; 30706 0	C; 31463 1	C; 06315 0
36,3320	37767 0	54145 0	00006 1	35660 1	52145 0	53677 1	31675 1	07357 1
36,3330	52146 0	52145 0	53677 1	00006 1	40001 1	20145 0	06112 0	I; 77661 0
36,3340	C; 20606 0	C; 00001 0	I; 77616 0	I; 52145 0	C; 35654 0	C; 75204 0	I; 60345 0	C; 00017 1
36,3350	C; 01677 0	I; 60325 0	C; 00041 1	C; 01676 1	I; 56342 1	I; 77446 1	41676 0	61675 1
36,3360	55675 0	54020 1	30020 0	60000 1	54000 0	13370 1	37763 1	13371 0
36,3370	37767 0	55676 0	27675 0	31675 1	54021 0	60021 1	55675 0	06112 0

OCTAL LISTING OF PARAGRAPH # 213, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

36,3400	I; 53740 1	C; 01676 1	C; 20601 1	I; 73006 0	C; 01675 1	I; 41366 1	I; 41414 0	C; 02345 1
36,3410	C; 75412 1	C; 35662 0	C; 00015 0	I; 77616 0	I; 41345 0	C; 00043 0	C; 00017 1	I; 40061 1
36,3420	C; 20207 0	C; 75107 0	I; 75446 0	I; 77605 1	I; 72205 0	C; 01723 0	C; 00145 1	I; 45325 1
36,3430	C; 00017 1	C; 35640 0	I; 77605 1	C; 00003 1	I; 65351 0	C; 00145 1	C; 00001 0	I; 76202 0
36,3440	I; 77771 0	I; 75301 1	C; 00047 1	C; 00017 1	I; 56005 1	C; 00015 0	C; 00047 1	I; 77614 1
36,3450	C; 02305 0	C; 75502 1	I; 43014 0	C; 02345 1	C; 75465 1	C; 02345 1	C; 75462 0	I; 52057 1
36,3460	C; 20564 1	C; 75475 0	I; 52057 1	C; 20575 1	C; 75475 0	I; 53614 1	C; 02345 1	C; 75473 0
36,3470	C; 20570 1	I; 77650 1	C; 75475 0	I; 77657 0	C; 20601 1	I; 77600 1	C; 75510 1	C; 00015 0
36,3500	I; 43401 0	C; 00001 0	I; 42414 0	C; 02342 0	C; 75505 0	I; 52057 1	C; 20604 1	C; 75475 0
36,3510	I; 52145 0	C; 35652 0	C; 75477 1	I; 71214 0	C; 02202 0	C; 75544 0	C; 01727 1	I; 60225 1
36,3520	C; 01731 0	C; 00047 1	I; 70525 1	C; 01733 1	I; 77671 1	I; 53605 1	C; 01735 1	C; 20202 0
36,3530	C; 01735 1	I; 71240 1	C; 75556 0	C; 00033 1	I; 45225 0	C; 01723 0	C; 01735 1	I; 50000 1
36,3540	C; 75570 1	C; 75570 1	I; 43545 1	C; 01735 1	I; 41345 0	C; 00027 1	C; 01725 0	I; 41325 0
36,3550	C; 00033 1	C; 01725 0	I; 77625 0	I; 52165 1	C; 01733 1	C; 75530 0	I; 45345 1	C; 00027 1
36,3560	C; 01723 0	I; 40025 1	C; 01735 1	C; 75575 1	I; 71244 0	C; 75575 1	C; 01735 1	I; 77616 0
36,3570	I; 45345 1	C; 00033 1	C; 01723 0	C; 01735 1	I; 77616 0	I; 45345 1	C; 00027 1	C; 01723 0
36,3600	C; 01735 1	I; 77616 0	I; 60345 0	C; 00041 1	C; 00047 1	I; 70525 1	C; 00043 0	I; 77671 1
36,3610	I; 41214 0	C; 02345 1	C; 75617 0	C; 35664 0	I; 52057 1	C; 20165 1	C; 75621 0	I; 77657 0
36,3620	C; 20173 0	I; 63366 1	C; 01701 0	I; 63361 0	C; 00023 0	C; 01715 0	I; 60435 0	C; 01701 0
36,3630	I; 74255 0	I; 46561 1	C; 35670 0	C; 02324 0	I; 77616 0	C; 00020 0	C; 00000 1	C; 00400 0
36,3640	C; 00000 1	C; 01000 0	C; 00000 1	C; 10000 0	C; 00000 1	C; 20000 0	C; 00000 1	C; 00000 1
36,3650	C; 00001 0	C; 37777 1	C; 37777 1	C; 37757 0	C; 37777 1	C; 00020 0	C; 14223 1	C; 00130 0
36,3660	C; 27103 0	C; 22031 0	C; 22343 0	C; 31111 1	C; 32405 1	C; 40010 1	C; 40042 0	C; 30276 1
36,3670	C; 05000 1	C; 00000 1	C; 00036 1	C; 03673 0	C; 03674 1	CKSM 45014 0	@	@
36,3700	@	@	@	@	@	@	@	@
36,3710	@	@	@	@	@	@	@	@
36,3720	@	@	@	@	@	@	@	@
36,3730	@	@	@	@	@	@	@	@
36,3740	@	@	@	@	@	@	@	@
36,3750	@	@	@	@	@	@	@	@
36,3760	@	@	@	@	@	@	@	@
36,3770	@	@	@	@	@	@	@	@

OCTAL LISTING OF PARAGRAPH # 214, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

37,2000	C; 00050 1	C; 00061 0	C; 01374 0	C; 01400 1	C; 01461 0	C; 01774 1	C; 00060 1	C; 60017 1
37,2010	C; 17777 0	C; 25252 0	C; 37737 0	C; 37776 0	C; 52400 1	C; 76777 1	C; 77770 1	C; 01371 0
37,2020	C; 00021 1	C; 02115 0	31353 0	00006 1	12033 1	00006 1	31376 1	51377 0
37,2030	52001 1	37767 0	55353 1	00004 0	30002 0	55357 0	55363 1	25365 0
37,2040	04760 1	C; 01102 0	11355 1	37767 0	55355 1	02115 0	01357 1	40000 0
37,2050	10000 0	12033 1	12033 1	12033 1	00002 0	40000 0	10000 0	12022 1
37,2060	12022 1	10000 0	12022 1	00002 0	00006 1	23371 0	05605 1	11355 1
37,2070	02075 1	02066 0	02075 1	25366 0	01371 0	62016 1	00006 1	62101 0
37,2100	03604 0	25366 0	67765 1	50000 1	02105 1	02116 0	03003 1	03057 0
37,2110	03153 0	03340 0	01371 0	01371 0	01371 0	02064 1	02120 0	02125 0
37,2120	12122 0	02033 0	46311 0	00002 0	02033 0	10000 0	02033 0	02033 0
37,2130	02132 0	02033 0	10000 0	02137 0	02033 0	02033 0	02033 0	55371 1
37,2140	11371 1	02145 0	02033 0	02033 0	02033 0	10000 0	02033 0	02152 0
37,2150	02033 0	02033 0	40000 0	10000 0	02033 0	02033 0	02033 0	10000 0
37,2160	02033 0	02164 0	02033 0	02033 0	41371 1	02056 0	37753 1	00006 1
37,2170	62211 1	40000 0	00006 1	62175 0	02033 0	33505 1	67763 1	00006 1
37,2200	62212 1	37767 0	00006 1	62205 1	02033 0	40000 0	00006 1	62213 0
37,2210	02033 0	02033 0	02033 0	32020 1	55377 1	34564 1	51377 0	54000 0
37,2220	10021 0	51377 0	40000 0	60021 1	00006 1	20021 0	00006 1	60021 1
37,2230	30021 1	70021 0	02055 0	00006 1	70021 0	00006 1	10021 0	30021 1
37,2240	02055 0	32017 0	55376 0	37771 1	55371 1	40000 0	57371 0	57372 0
37,2250	00006 1	51376 1	30001 0	00006 1	52017 0	40001 1	02056 0	30001 0
37,2260	02055 0	00006 1	51376 1	30001 0	02055 0	30001 0	02056 0	37745 0
37,2270	55371 1	37762 0	55372 1	37763 1	01371 0	02056 0	01371 0	02050 0
37,2300	37766 1	00006 1	12325 0	40000 0	00006 1	12326 0	33505 1	67763 1
37,2310	00006 1	12327 1	40000 0	00006 1	12330 1	37767 0	00006 1	12321 1
37,2320	02033 0	40000 0	00006 1	12331 0	02033 0	02033 0	02033 0	02033 0
37,2330	02033 0	33505 1	67762 0	55371 1	02033 0	40000 0	55372 1	43505 0
37,2340	54001 1	40000 0	53372 1	02055 0	30001 0	02056 0	00006 1	27371 1
37,2350	00006 1	27372 1	33505 1	61372 0	02055 0	43505 0	61371 0	02056 0
37,2360	37763 1	00006 1	26000 0	00006 1	26000 0	02050 0	00006 1	26000 0
37,2370	02047 0	37771 1	54001 1	37762 0	20001 1	65340 0	02055 0	37763 1

OCTAL LISTING OF PARAGRAPH # 215, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

37,2400	60001 0	02056 0	00006 1	33506 1	53374 1	35336 1	54001 1	36311 1
37,2410	21374 1	22000 1	02047 0	30001 0	02055 0	00006 1	31374 0	22000 1
37,2420	02056 0	30001 0	02055 0	25374 0	61374 0	02050 0	24000 1	02055 0
37,2430	00006 1	43506 0	53372 1	36311 1	54001 1	40000 0	21372 1	02056 0
37,2440	00006 1	41372 1	56001 0	67763 1	02056 0	30001 0	02055 0	37763 1
37,2450	00006 1	24000 1	55375 0	40000 0	54002 1	40000 0	00006 1	73505 0
37,2460	60001 0	00006 1	70002 1	26001 1	62013 1	02056 0	30001 0	00006 1
37,2470	71375 0	55376 0	00006 1	25376 1	60001 0	00006 1	71376 0	02055 0
37,2500	40001 1	62013 1	02050 0	37763 1	27376 0	02056 0	31376 1	02056 0
37,2510	37746 0	55371 1	60000 1	67763 1	54001 1	02033 0	40000 0	55372 1
37,2520	37770 0	23371 0	00006 1	11371 1	40000 0	22000 1	02047 0	00006 1
37,2530	11372 1	55374 1	40000 0	55373 0	67746 0	02050 0	30001 0	02050 0
37,2540	33505 1	54001 1	32010 1	00006 1	11373 0	56001 0	40000 0	00006 1
37,2550	11374 1	62013 1	02056 0	33505 1	56001 0	67746 0	02055 0	42010 0
37,2560	00006 1	11374 1	60001 0	62013 1	02055 0	56001 0	02056 0	42013 0
37,2570	54002 1	40000 0	00006 1	10002 1	00006 1	22001 0	60002 0	02056 0
37,2600	30001 0	63505 1	02055 0	00006 1	23371 0	30002 0	02055 0	41371 1
37,2610	67762 0	02056 0	37767 0	55371 1	40000 0	55372 1	00006 1	20000 0
37,2620	02047 0	00006 1	21372 1	02055 0	00006 1	33506 1	00006 1	20001 1
37,2630	54000 0	02633 0	02033 0	02056 0	37765 1	54001 1	72016 0	02047 0
37,2640	37763 1	70001 1	02055 0	37763 1	54001 1	55371 1	50000 1	60000 1
37,2650	00006 1	61371 0	02055 0	00006 1	50001 0	60000 1	02056 0	37762 0
37,2660	54001 1	37763 1	00006 1	40001 1	02056 0	52002 1	55373 0	60002 0
37,2670	02055 0	30001 0	02047 0	37771 1	54002 1	40000 0	00006 1	30002 0
37,2700	60002 0	61373 1	02055 0	30001 0	02056 0	35336 1	54002 1	33506 1
37,2710	26002 1	40002 1	54000 0	02033 0	00006 1	30002 0	54000 0	02721 1
37,2720	02033 0	02056 0	37746 0	54002 1	26002 1	26002 1	54000 0	02033 0
37,2730	26002 1	02055 0	00004 0	37767 0	54015 1	00003 1	60027 1	55371 1
37,2740	41371 1	60027 1	00006 1	12740 1	00004 0	30015 0	00006 1	12751 1
37,2750	02732 0	37763 1	05663 1	C: 02776 0	C: 76063 0	33505 1	62012 0	00003 1
37,2760	40000 0	10000 0	02766 1	C: 02772 1	67762 0	02760 1	00004 0	55375 0
37,2770	02033 0	00003 1	40015 1	00006 1	13002 1	03003 1	40015 1	62763 1

OCTAL LISTING OF PARAGRAPH # 216, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

37,3000	02056 0	05727 0	02033 0	37771 1	00006 1	01002 1	22002 0	02056 0
37,3010	00006 1	00001 0	02056 0	30001 0	02056 0	46311 0	54001 1	32013 1
37,3020	00006 1	04001 1	02056 0	32013 1	00006 1	05001 0	02056 0	30001 0
37,3030	02056 0	42013 0	54001 1	32010 1	00006 1	02001 1	02055 0	32010 1
37,3040	00006 1	03001 0	02055 0	47766 0	56001 0	02055 0	36306 1	00006 1
37,3050	06001 0	67762 0	02056 0	30001 0	67761 0	02056 0	02064 1	00006 1
37,3060	33506 1	53377 1	31376 1	56002 0	00006 1	40002 1	10000 0	03076 0
37,3070	03103 0	55376 0	61377 0	02056 0	25377 0	03062 0	60001 0	02056 0
37,3100	05605 1	41376 0	03063 1	31377 0	61376 1	02050 0	33506 1	55375 0
37,3110	40000 0	00004 0	63505 1	67763 1	56002 0	10002 1	03133 0	02033 0
37,3120	55373 0	02033 0	31373 1	61375 1	02056 0	00003 1	05605 1	31374 0
37,3130	00006 1	27375 0	03111 0	55374 1	03144 0	31374 0	61375 1	02056 0
37,3140	31375 1	63506 1	67771 1	03114 0	31375 1	02050 0	41374 1	62013 1
37,3150	02056 0	00003 1	02064 1	37763 1	55374 1	37767 0	54003 0	32004 1
37,3160	55377 1	35337 0	55373 0	03203 0	32003 0	55377 1	35337 0	55373 0
37,3170	03203 0	32003 0	55377 1	32005 0	55373 0	03203 0	55374 1	32001 1
37,3200	55377 1	32002 1	55373 0	00004 0	00006 1	51377 0	30001 0	53376 0
37,3210	31377 0	55353 1	54001 1	24001 0	50000 1	52001 1	51377 0	40001 1
37,3220	51377 0	60000 1	02056 0	31353 0	00006 1	13251 0	00006 1	51377 0
37,3230	40001 1	51377 0	52001 1	51377 0	40000 0	51377 0	60001 0	02056 0
37,3240	31353 0	00006 1	13251 0	00006 1	31376 1	51377 0	52001 1	37767 0
37,3250	55353 1	00003 1	30003 1	55374 1	05605 1	31372 0	54003 0	25377 0
37,3260	41377 1	61373 1	00006 1	13265 1	03203 0	11374 1	03176 1	25374 0
37,3270	30003 1	67753 1	54003 0	62015 1	00006 1	13171 1	10003 0	03164 1
37,3300	32003 0	54003 0	32000 0	55372 1	67760 1	50000 1	40000 0	11372 1
37,3310	03303 1	32011 0	54020 1	54022 0	54021 0	54023 1	60020 0	60022 1
37,3320	60021 1	60023 0	62014 0	02056 0	60020 0	60022 1	60021 1	60023 0
37,3330	67763 1	02056 0	25367 1	02064 1	03340 0	04632 1	04637 1	03342 1
37,3340	37770 0	55376 0	37767 0	55374 1	37763 1	55377 1	37767 0	55371 1
37,3350	55373 0	37763 1	55375 0	31374 0	54001 1	74560 1	61373 1	05245 1
37,3360	03403 0	67751 0	03414 0	40000 0	55377 1	00006 1	13371 0	37750 1
37,3370	03372 1	35634 0	55373 0	37767 0	55371 1	37763 1	55375 0	51373 1

OCTAL LISTING OF PARAGRAPH # 217, WITH PARITY BIT IN BINARY AT THE RIGHT OF EACH WORD; "@" DENOTES UNUSED FIXED MEMORY.

ALL VALID WORDS ARE BASIC INSTRUCTIONS EXCEPT THOSE MARKED "I" (INTERPRETIVE OPERATOR WORDS) OR "C" (CONSTANTS).

37,3400	30000 1	03403 0	03414 0	55372 1	61371 0	55371 1	37767 0	61371 0
37,3410	55371 1	41372 1	61373 1	00002 0	22000 1	11375 0	03421 0	03421 0
37,3420	03510 0	10001 1	03431 1	03431 1	03431 1	11375 0	03432 1	37771 1
37,3430	03432 1	37763 1	55375 0	11376 0	10067 1	05532 0	03440 1	05605 1
37,3440	25373 1	11377 1	03353 1	03353 1	03377 1	03377 1	41374 1	63530 1
37,3450	00006 1	13503 0	31374 0	67751 0	55374 1	03461 1	37745 0	27374 1
37,3460	03475 1	74560 1	00006 1	13473 0	62010 1	00006 1	13470 0	03475 1
37,3470	32006 0	27374 1	03475 1	62007 1	27374 1	11377 1	03345 0	37763 1
37,3500	03363 1	37755 1	03345 0	11376 0	03342 1	C; 37777 1	C; 40000 0	03603 1
37,3510	31374 0	74560 1	04541 0	54001 1	31374 0	74564 0	00006 1	13525 1
37,3520	54021 0	30001 0	77765 0	60021 1	54001 1	11376 0	03560 1	C; 00501 0
37,3530	C; 76060 0	11371 1	03536 1	C; 77763 1	03536 1	37771 1	55371 1	40001 1
37,3540	61371 0	02056 0	03446 1	37763 1	55376 0	37767 0	55355 1	32021 0
37,3550	55354 0	00004 0	37751 0	05505 1	C; 03335 1	C; 76062 1	00003 1	05567 0
37,3560	30001 0	57372 0	55373 0	32017 0	54146 0	33527 1	04444 1	03601 0
37,3570	04622 0	04475 0	03575 0	03446 1	03563 1	04724 1	32021 0	55371 1
37,3600	05567 0	33533 1	04654 1	02115 0	40000 0	67762 0	00006 1	63613 0
37,3610	37767 0	55355 1	03633 1	37767 0	55355 1	02115 0	C; 05465 0	C; 04143 0
37,3620	C; 05471 0	C; 05573 0	C; 04757 0	C; 05736 0	C; 05634 0	C; 05163 0	C; 05675 0	C; 05777 0
37,3630	C; 07265 1	C; 00013 0	C; 00042 1	34570 1	55373 0	00004 0	37763 1	05663 1
37,3640	C; 03674 1	C; 76063 0	00003 1	03615 0	55373 0	00004 0	51373 1	43616 1
37,3650	54313 1	54314 0	54315 1	54316 1	54317 0	54320 1	54321 0	54322 0
37,3660	54323 1	54324 0	54325 1	33631 0	54307 1	00004 0	37752 0	05663 1
37,3670	C; 03674 1	C; 76063 0	00003 1	05727 0	11373 0	03644 1	03703 0	03720 1
37,3700	11372 1	03734 1	03740 1	47763 0	55373 0	33632 0	00006 1	05011 1
37,3710	43630 0	00004 0	54313 1	54316 1	54320 1	36311 1	54307 1	03665 1
37,3720	47767 1	55373 0	37763 1	55372 1	00004 0	43630 0	54314 0	54317 0
37,3730	54321 0	36311 1	54307 1	03665 1	55372 1	47750 0	00004 0	03650 1
37,3740	43632 1	00006 1	03011 1	05727 0	C; 03744 0	C; 03745 1	CKSM 75654 1	@
37,3750	@	@	@	@	@	@	@	@
37,3760	@	@	@	@	@	@	@	@
37,3770	@	@	@	@	@	@	@	@

THE ASSEMBLY WAS GOOD; MANUFACTURABLE BINARY RECORDS STORED ON 2NDFROZE.

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*       ENDJOB
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PRINTED 00003 TIME: 02:55.2

WILSON JONES

GrayLine®

NYLON POST BINDER

14-1411 N

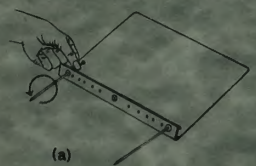
TYPE 1/.020 GENUINE PRESSBOARD

2 PURPOSE BINDER

This binder may be used to bind both marginal-punched sheets and forms punched with 2¼", 4¼", 6", 7", 8½", 13¾" and 14¾" center-to-center holes

1. MARGINAL-PUNCHED SHEETS

BURST



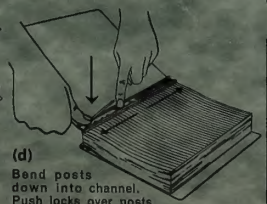
(a)
Insert posts in end holes of stub. Turn counter-clockwise until heads are flush against inside of channel.



(b)
Gather sheets in even stack. Insert posts in second holes from both ends of the sheets.

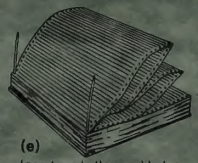


(c)
Put top cover on with stub turned under. Insert posts thru end holes.



(d)
Bend posts down into channel. Push locks over posts toward outside ends of channel until snug.

UNBURST



(e)
Insert posts thru end holes of stub as in illustration (a). Plug posts into top holes in both margins of sheets. Put on top cover as in illustrations (c) and (d). (Also see No. 2 below)

TOP AND BOTTOM LOADING

This binder may be loaded from the top or bottom by using posts without screw heads. Ask the dealer from whom you bought the binder for Posts and Slides Pack No. 1323.

2. CONVENTIONALLY PUNCHED LOOSE LEAF SHEETS AND STRIPPED UNBURST SHEETS

Follow steps (a) thru (d) at left, except that posts should be threaded into holes in stub that correspond to holes in forms or sheets to be bound.

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(J2675 A)

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Made in U. S. A.